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UNIVERSITY OF CALIFORNIA

ANNUAL ANNOUNCEMENT

OF

COURSES OF INSTRUCTION

IN THE COLLEGES OF LETTERS, SOCIAL SCIENCES, NATURAL SCIENCES, COMMERCE, AGRICULTURE, MECHANICS, MINING, CIVIL ENGINEERING, AND CHEMISTRY,

FOR THE ACADEMIC YEAR 1902-1903

BERKELEY
The University Press
1902

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COURSES OF INSTRUCTION OFFERED IN THE COLLEGES AT BERKELEY FOR THE ACADEMIC YEAR 1902–03.

The hours of recitation, lecture, etc., are given for most of the courses. The following abbreviations are used: M, Monday; Tu, Tuesday; W, Wednesday; Th, Thursday; F, Friday; S, Saturday; A, Agricultural Experiment Station Building; B, Botany Building; C, Chemistry Building; E, East Hall; G, Harmon Gymnasium; H, Hearst Gymnasium; L, Bacon Art and Library Building; M, Mechanics Building; MC, Mining and Civil Engineering Building; N, North Hall; O, Students' Observatory; P, Philosophy Building; S, South Hall. Courses permissible for the Group Elective are denoted by the abbreviation (G.E.).

PHILOSOPHY.

GEORGE H. HOWISON, M.A., LL.D., Mills Professor of Intellectual and Moral Philosophy and Civil Polity.

CHARLES M. BAKEWELL, Ph.D., Associate Professor of Philosophy.

GEORGE M. STRATTON, Ph.D., Associate Professor of Psychology, and Director of the Psychological Laboratory.

WILLIAM P. MONTAGUE, Ph.D., Instructor in Philosophy.

HARRY A. OVERSTREET, A.B., B.Sc. (Oxon.), Instructor in Philosophy.

KNIGHT DUNLAP, M.L., Assistant in the Psychological Laboratory.

The Group Elective. Complete Group Electives in Philosophy can be made up in four different directions, viz.: I, in Philosophy proper, including its history and the direct discussion of its chief problems, but more especially its metaphysical and ethical problems; II, in Psychology; III, in Logic and the Theory of Knowledge; IV, in the Department at large. Under IV, there can be several combinations, according to the student's preference; for exact information as to these, the head of the department must be consulted.

In combining Philosophy with other subjects to form a Group Elective, not fewer than 12 units in Philosophy are permissible. Courses 1, 2, and 20 cannot form part of any Group Elective. All

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courses but 15 and 20 may be taken as Free Electives, subject to the prerequisite for each.

Teachers' Courses. Courses 1, 2, 3, 4, 13, and 24 are especially valuable for teachers, actual or prospective.

1. **Formal Logic.** Dr. MONTAGUE and Mr. OVERSTREET.

With especial reference to practice on division, definition, the forms and transformations of judgments, the syllogism, deductive and inductive, and fallacies.

3 hrs., either half-year. M W F. In four sections. Sections I (Dr. Montague) and II (Mr. OVERSTREET), 1; Section III (Mr. OVERSTREET), 2; Section III (Dr. MONTAGUE), 3. Prerequisite: At least Sophomore standing, or status of Special Student in Education.

2. **General Psychology.**
Associate Professor STRATTON and Dr. MONTAGUE.

The facts of consciousness, their classification and analysis, and their relations to the nervous system; with demonstrations in brain anatomy and in psychological experiment.

3 hrs., either half-year. In three sections. Associate Professor STRATTON: lecture to all sections, M, 3; and Section I, W F, 3. Dr. MONTAGUE: Section II, W F, 9; Section III, W F, 2. Prerequisite: Usually Junior standing or status of Special Student in Education; but Sophomores free from deficiencies may take the course.

3. **History of Philosophy.** (G.E.)*
Professor HOWISON and Associate Professor BAKEWELL.

Critical account of Occidental Philosophy in outline, from its beginnings in Ionia to the present time.

2 hrs., throughout the year. M F, 10. First half-year: Ancient and Mediæval Philosophy, Associate Professor BAKEWELL. Second half-year: Modern Philosophy, Professor HOWISON. Prerequisite: Usually, Junior standing or status of Special Student in Education; but Sophomores free from deficiencies may take the course.

SPECIAL NOTICE.—Courses 1, 2, and 3 may all be taken in one year, if students so elect; that is, they may accompany Course 3 with Course 1 in the first half-year, and with Course 2 in the second, or *vice versa*. Or they may take Courses 1 and 2 together in either half-year.

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*May only be included in the Group Elective by students combining Philosophy with other subjects.

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4. Ethics, including Civil Polity. (G.E.)
Professor HOWISON, assisted by Mr. OVERSTREET.

A general introduction to the subject, including: An outline history of ethical theories; critique of the conflict between hedonism and rigorism, determinism and freedom, pessimi.m and optimism; investigation of the nature of a State, and its bearing on the limits of liberty and allegiance; sketch of the history of political theories.

4 hrs., throughout the year. M Tu Th F., 9. First half-year: Professor HOWISON, M Tu Th; Mr. OVERSREET, F. Second half-year: Professor HOWISON, Tu Th; Mr. OVERSTREET, M F. Prerequisite: Courses 1, 2, and 3.

SPECIAL NOTICE. — In taking Course 4 as part of the Group Elective in the special direction of Psychology or of Logic, the student may divide it, so as to make it include but four units. This may be doue (1) by taking the subject during the first half-year only; or (2) by taking it during the second half-year only. For this purpose the first part must be registered as Course 4A, and the second part as Course 4B. But this privilege is usually restricted to students with the special Group Elective named; in the case of others, special application for it must be made to the head of the department.

5. The Philosophy of Kant. (G.E.) Professor HOWISON.

The cardinal distinctions and doctrines of the system expounded and criticised.

2 hrs., throughout the year. Tu Th, 11. Prerequisite: Courses 1, 2, and 3. (Course 13 is advised as precedent, and Course 4 as accompaniment.)

6. Introduction to Psychological Experiment. (G.E.)*
Associate Professor STRATTON, assisted by Mr. DUNLAP.

Demonstration of characteristic groups of experiments, with individual practice in the use of apparatus and in the application of the experimental methods of psychological research.

2 hrs., throughout the year. Tu Th, 3. Prerequisite: Course 2. (Students are advised to bring also Courses 1 and 3, or at any rate to take Course 3 as an accompaniment.)

10. Inductive Logic. (G.E.) Dr. MONTAGUE.

Based on a study of Mill's Logic and the later standard writings on Induction, with the aim of attaining a critical philosophy of the logic of observational science.

* May only be included in the Group Elective by the students combining Philosophy with other subjects.

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2 hrs., throughout the year. M W, 11. Prerequisite: Course 1; or status of Special or Regular Student in Education, if the applicant is approved after conference with the instructor. Course 3 must either precede or accompany this course. (Courses 2, 6, and 13 would form valuable auxiliaries.)

*11. **Higher Logic, as Theory of Truth and Reality.** (G.E.)
Mr. OVERSTREET.

Based on a study and criticism of the logical doctrines of Plato and Aristotle; Spinoza and Leibnitz; Fichte and Hegel; Lotze, Bradley, and Bosanquet.

2 hrs., throughout the year. Hours to be arranged with students. Prerequisite: Course 10. (Courses 5, 16, and 23, or so many of them as practicable, should be combined with this course by students who have not already completed them.)

13. **Psychological Conference.** (G.E.)
Associate Professor STRATTON.

Discussion of selected topics in psychology, in their historical setting, and as treated by writers of the present day.

2 hrs., second half-year. M, 10–12. Prerequisite: Courses 3 and 6.

15. **Psychological Research.** (G.E.)
Associate Professor STRATTON, assisted by Mr. DUNLAP.

Individual investigation, by the methods of the laboratory, of special problems assigned for original inquiry.

Not less than 9 hrs. throughout the year—3 units; but at least 15 hrs.—5 units—recommended. Units and hours to be arranged with each student, at times within M Tu W Th F, 1–4. Prerequisite: Course 9, or its equivalent; permission to elect the course, obtained from the director after conference. The course is primarily for Graduates, though qualified Seniors will be admitted to it.

16. **Plato and Aristotle.** (G.E.) Associate Professor BAKEWELL.

Introduction to their system by a comparative study.

2 hrs., throughout the year. M F, 3. Prerequisite: Courses 1, 2, and 3, and a reading knowledge of Greek. Familiarity with Latin, and German or French, is desirable, though not for the present required.

This course may be counted also as Group Elective in Greek.

* Not to be given in 1902–03.

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17. **Scholastic Philosophy.** (G.E.)
Associate Professor BAKEWELL.

An introductory study of mediæval thought, with especial reference to the systems of Aquinas and Scotus.

2 hrs., throughout the year. Hours to be arranged with students. Prerequisite: Courses 1, 2, and 3; Course 16, as accompaniment, if not previously completed. (Familiarity with Latin, Greek, and German or French, is an important adjunct, but is not for the present required.)

18. **Theory of Knowledge.** (G.E.) Associate Professor BAKEWELL.

Development and criticism of the leading theories of knowledge, aiming at a constructive result.

3 hrs, second half-year. M W F, 2. Prerequisite: Courses 1, 2, and 3.

20. **Philosophical Seminary.**
The Department STAFF OF INSTRUCTION.

Topics changed from year to year, upon conference among the teaching members, some one of whom will be made director for the year. Subject for 1902–03: Some Fundamental Problems in Logic. Director, Professor HOWISON.

2 hrs., throughout the year, at hours to be arranged with members. Prerequisite: Graduate standing, a good reading knowledge of German or other languages requisite to a first-hand study of texts, and thorough acquaintance with the subjects of Courses 1–5, 10 and 11, 16–18; permission to join the seminary, obtained from the director after conference.

*21. **English Philosophy from Hobbes to Spencer.** (G.E.)
Associate Professor BAKEWELL.

A critical study of the development of English empiricism.

2 hrs., throughout the year. Prerequisite: Courses 1, 2, and 3.

22. **Modern French Philosophy.** (G.E.)
Associate Professor BAKEWELL.

The development of French philosophy in the eighteenth and nineteenth centuries, with especial reference to the schools of Cousin, Comte, and Renouvier.

2 hrs., first half-year. Hours to be arranged with students. Prerequisite: Courses 1, 2, and 3. (A reading knowledge of French is expected of students electing this course.)

* Not to be given in 1902–03.

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*23. German Idealism after Kant: The Philosophy of Fichte, Schelling, and Hegel. (G.E.)

Associate Professor BAKEWELL.

A study of the development of the Kantian philosophy in Germany, with especial reference to the system of Hegel.

2 hrs., second half-year. Prerequisite: Course 5. (A reading knowledge of German is important for this course.)

*24. History of Psychology. (G.E.) Dr. MONTAGUE.

Critical account of psychological theory and method from Aristotle to the present time.

2 hrs., throughout the year. Hours to be arranged with students. Prerequisite: Same as for Course 2, which must either precede or accompany this course.

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* Not to be given in 1902–03.

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EDUCATION.

ELMER ELLSWORTH BROWN, Ph.D., Professor of the Theory and Practice of Education.

FLETCHER B. DRESSLAR, Ph.D., Assistant Professor of the Science and Art of Teaching.

ERNEST C. MOORE, LL.B., Ph.D., Instructor in Education.

THOMAS L. HEATON, B.L., LL.B., Assistant in Education.

MILTON NEWMARK, M.L., Reader in Education.

It is the purpose of the courses in Education to afford such instruction in the principles and the history of education as is desirable in a truly liberal culture, and to provide adequate professional preparation for University students who wish to teach. The undergraduate courses are reserved for the third and fourth years of college residence. Students who purpose taking any of the courses in Education are advised to prepare for the study by taking one or more courses in Psychology.

The Group Elective. Eighteen units of the Group Elective in Education must be taken in the Department of Education. The remaining six units may be chosen from courses in the Department of Education, or in the Department of Philosophy, or in both. Not more than four units of the six may be taken in a pedagogical course in some other department in which the student is to receive the recommendation for a teacher's certificate. Students may also make the Group Elective in Philosophy and Education together, subject to the limitation indicated by the Department of Philosophy.

Courses in Other Departments. Courses of special interest and value to teachers are offered in several departments of the University. Attention is called to the announcement of such courses in Philosophy, History and Political Science, Political Economy, Greek, Latin, English, Mathematics, Physics, Chemistry, and Zoölogy. The University Extension courses and the courses in the Summer School are usually of like interest and value to teachers.

Teachers' Certificates. For the conditions under which Recommendations for Teachers' Certificates are issued, see Joint Regulations of the Faculties, in the University REGISTER.

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1. The Practice of Teaching. (G.E.) Mr. HEATON.

Lectures and readings three hours a week, together with school observation or practice of teaching under the direction of the instructor.

4 or 5 hrs., second half-year. W, 4; S, 10–12. Prerequisite: At least Junior standing; three courses selected from 3 or (4), 5, 10A, 12, 13A, 14, and 18. Admission only on consultation with the instructor in charge.

1A. Practice Course. (G.E.) Mr. HEATON.

Lectures and readings three hours a week, together with school observation or practice of teaching under the direction of the instructor.

4 or 5 hrs., first half-year. Tu, 4; S, 10–12. Prerequisite: At least Junior standing; three courses selected from 3 (or 4), 5, 6, 10A, 12, 13A, 14, and 18. Admission only on consultation with the instructor in charge.

2A. School Supervision. (G.E.) Assistant Professor DRESSLAR.

Seminary for the study of problems in the organization, grading, and management of schools; intended especially for those who are preparing to become school principals or superintendents.

2 hrs., first half-year. S, 8–10. Primarily for graduates. Admission only on consultation with instructor.

2B. Visitation of Schools. (G.E) Assistant Professor Dresslar.

Three hours a week, with special reference to observing methods of organization, grading, and management.

1 hr., first half-year. Course 2B may be taken only in conjunction with Course 2A.

3. The History of Education: Earlier Periods. (G.E.) Dr. MOORE.

3 hrs., first half-year. M W F, 3. Prerequisite, course 2 or 3 in Philosophy.

4. The History of Education: Later Periods. (G.E.) Dr. MOORE.

3 hrs., second half-year. M W F, 3. Prerequisite: Course 2 or 3 in Philosophy.

5. The Theory of Education. (G.E.) Professor BROWN.

Lectures, discussions, and readings.

3 hrs., first half-year. M W F, 10. Prerequisite: At least Junior standing; Courses 1 and 2 in Philosophy.

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6. **School Systems.** (G.E.) Assistant Professor DRESSLAR.

Lectures and readings.

2 hrs., second half-year. M F, 9. Prerequisite: At least Junior standing.

7A. **Seminary for the Study of Special Problems in Education.** (G.E.) Professor BROWN.

2 hrs., first half-year. S, 10-12. Open to a limited number of graduate students.

7B. **Seminary for the Study of Special Problems in Education.** (G.E.) Professor BROWN.

2 hrs., second half-year. S, 10–12. Open to a limited number of graduate students. 7B may be elected in addition to 7A without repetition of subject-matter. 7A or 7B may be elected separately.

10A. **Introduction to Pedagogy.** (G.E.) Assistant Professor DRESSLAR.

Lectures, discussions, and readings.

3 hrs., first half-year. M W F, 9. Prerequisite: At least Junior standing; Course 2 in Philosophy.

10B. **Visitation of Schools.** (G.E.) Assistant Professor DRESSLAR.

3 hrs., first half-year—1 unit. Prerequisite: At least Junior standing; Course 2 in Philosophy. Course 10B may be taken only in conjunction with Course 10A.

11A. **Seminary for the Study of Children.** (G.E.) Assistant Professor DRESSLAR.

2 hrs., first half-year. Th, 2–4. Primarily for graduates.

11B. **Seminary for the Study of Children.** (G.E.) Assistant Professor DRESSLAR.

2 hrs., second half-year. Th, 2–4. Primarily for graduates. 11B may be elected in addition to 11A without repetition of subject-matter.

12. **School Hygeine.** (G.E.) Assistant Professor DRESSLAR.

Lectures and readings.

2 hrs., second half-year. Section I, M F, 8; Section II, S, 8–10; Prerequisite: At least Junior standing.

13A. **Studies in Secondary Education.** (G.E.) Professor BROWN.

Lectures and readings.

3 hrs., second half-year, M W F, 10. Prerequisite: Course 5.

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13B. **Visitation of Secondary Schools.** (G.E.)
Professor BROWN and Dr. MOORE.

1 hr., second half-year. One half-day a week. Admission on consultation with the instructor in charge.

13C. **Visitation of Secondary Schools.** (G.E.)
Professor BROWN and Dr. MOORE.

1 hr., first half-year. One half-day a week. Admission on consultation with the instructor in charge.

15. **Special Studies.** (G.E.)
Professor BROWN and Assistant Professor DRESSLAR.

Either half-year. M, 4–6. Primarily for Graduates. Credit value and topics to be arranged with individual students.

16. **Selected Topics in the Theory and Practice of Education.** (G.E.)
Assistant Professor DRESSLAR.

Lectures and readings.

2 hrs., first half-year. M F, 8. Prerequisite: Course 5 or 10A.

17. **The Educational Theory of Herbart.** (G.E.) Dr. MOORE.

Lectures and readings.

2 hrs., first half-year. Tu Th, 3. Prerequisite: Course 2 in Philosophy.

18. **Studies in Educational Method.** (G.E.) Dr. MOORE.

Lectures and readings.

2 hrs., second half-year. Tu Th, 3. Prerequisite: Course 2 in Philosophy.

19A. **Seminary for the Study of Mental Development.** (G.E.)
Dr. MOORE.

2 hrs., first half-year. Tu Th, 2. Primarily for Graduates. Prerequisite: Course 2 in Philosophy.

19B. **Seminary for the Study of Mental Development.** (G.E.)
Dr. MOORE.

2 hrs., second half-year. Tu Th, 2. Primarily for Graduates. Prerequisite: Course 19A.

Methods of Modern Charities and Corrections: Theoretical.
Dr. MOORE.

[See Political Economy 18.]

Methods of Modern Charities and Corrections: Investigation.
Dr. MOORE.

[See Political Economy 19.]

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JURISPRUDENCE.

WILLIAM CAREY JONES, M.A., Professor of Jurisprudence.

CURTIS H. LINDLEY, Honorary Professor of the Law of Mines and Water.

GEORGE H. BOKE, M.A., Instructor in Jurisprudence.

WILLIAM H. GORRILL, M.A., LL.B., Instructor in Law.

———, Instructor in Law.

LOUIS T. HENGSTLER, M.A., Ph.D., Lecturer in Law.

WILLIAM B. BOSLEY, A.B., LL.B., Lecturer in Law.

WARREN OLNEY, Jr., A.B., LL.B., Lecturer in Law.

———, Lecturer in Law.

Graduate standing implies that the student has credit for Courses 11, 12, 13, 15, 19, 5.

English 12B, Old English Laws, together with English 5, and Latin 21, Juristic Latin, may be included in the Group Elective in Jurisprudence.

Mid-year Examinations will not be held in Courses 11, 12, 13, 15, and 19.

10. Elementary Law and Jurisprudence. Mr. BOKE.

An exposition of the main principles underlying the Common Law in the light of jurisprudence.

2 hrs., throughout the year. Tu Th, 8.

3. Principles of International Law. (G.E.) Mr. BOKE.

2 hrs., throughout the year. Tu Th, 9. Prerequisite: At least Junior standing.

*14. Administrative Law. (G.E.) Mr. BOKE.

2 hrs., throughout the year. Prerequisite: At least Junior standing.

*1. Formation of the Federal Constitution. (G.E.) Professor JONES.

1 hr., either half-year. Prerequisite: Any two courses in History and Political Science.

*Not to be given in 1902–03.

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5. Roman Law. (G.E.) Professor JONES.

4 hrs., first half-year. M W F —, 9. Prerequisite: Junior standing. Required for the Group Elective in Jurisprudence.

*18. Commercial Law. Dr. HENGSTLER.

2 hrs., throughout the year. Tu Th, 4. Prerequisite: At least Junior standing.

11. The Law of Property (First year.) (G.E.) ———.

3 hrs., throughout the year. Tu Th —, 8. Prerequisite: Senior standing.

12. The Law of Torts. (G.E.) Mr. GORRILL.

3 hrs., throughout the year. Tu Th —, 9. Prerequisite: Senior standing.

13. The Law of Crimes. (G.E.) Mr. BOKE.

3 hrs., throughout the year. Tu Th —, 10. Prerequisite: Senior standing.

15. The Law of Contracts. (G.E.) Mr. BOKE.

4 hrs., throughout the year. M W F —, 8. Prerequisite: Senior standing.

19. Common Law Pleading. (G.E.) Mr. GORRILL.

2 hrs., throughout the year. S, 8. Prerequisite: Senior standing.

17. The Law of Property. (Second year.) Mr. BOSLEY.

2 hrs., throughout the year. Tu Th, 8. Prerequisite: Graduate standing.

20. Agency and Partnership. Mr. GORRILL.

2 hrs., throughout the year. M W, 9. Prerequisite: Graduate standing.

21. The Law of Evidence. Mr. OLNEY.

2 hrs., throughout the year. Tu Th, 8. Prerequisite: Graduate standing.

22. Principles of Equity. Mr. GORRILL.

2 hrs., throughout the year. M W, 8. Prerequisite: Graduate standing.

24. The Law of Sales and Negotiable Paper. Professor JONES.

4 hrs., first half-year. M W F —, 11. Prerequisite: Graduate standing.

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26. **The Law of Bailments and Carriers.** Dr. HENGSTLER.

2 hrs., throughout the year. Tu, Th, 4. Prerequisite: Graduate standing.

25. **The Law of Corporations.** ———.

2 hrs., throughout the year. Prerequisite: Graduate standing.

27. **The Law of Trusts.** ———

2 hrs., throughout the year. Prerequisite: Graduate standing.

28. **The Law of Property.** (Third year.) ———

2 hrs., throughout the year. Prerequisite: Graduate standing.

2. **Constitutional Law of the United States.** Professor JONES.

3 hrs., throughout the year. M W F, 10. Prerequisite: Graduate standing.

29. **Code Pleading and Practice.** ———.

Three hours, throughout the year. Prerequisite: Graduate standing.

16. **The Law of Mines and Water.** Professor LINDLEY.

1 hr., during two years. W, 4:00. Prerequisite: Graduate standing.

7. **Principles of Jurisprudence.** Professor JONES.

2 hrs., throughout the year. Prerequisite: Graduate standing.

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* Not to be given in 1902–03.

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HISTORY AND POLITICAL SCIENCE.

*BERNARD MOSES, Ph. D., Professor of History and Political Economy.

THOMAS R. BACON, A.B., B.D., Professor of Modern European History.

H. MORSE STEPHENS, M.A., Professor of History, and Director of University Extension.

KENDRIC C. BABCOCK, Ph.D., Assistant Professor of History and Political Science.

THOMAS W. PAGE, Ph.D., Assistant Professor of History and Economics.

WILLIAM S. FERGUSON, Ph.D., Instructor in Greek and Roman History.

GAILLARD THOMAS LAPSLEY, Ph.D., Instructor in History.

HIRAM VAN KIRK, Ph.D., Lecturer in History.

——— ———, Reader in History.

——— ———, Reader in History.

The Group Elective. Prerequisite: For students in the Colleges of Social Sciences and Natural Sciences, any five courses, of which one may be Course 1 in Political Economy. For students in the College of Letters, any three courses, of which one may be Course 1 in Political Economy. With the exception of those courses under the division headed "Primarily for First and Second Year Students," any course may be counted as Group Elective.

FOR FIRST AND SECOND YEAR STUDENTS.

51. (See Course 1, in Political Economy.)

52. History of England. Professor STEPHENS.

A discussion of the History of England so conducted as to serve as an introduction to the general study of History, dealing with such matters as the use of documents, the importance of geography, the distinction between constitutional and institutional history, and the party system. Text-books, Gardiner, Students' History of England; Gardiner, Atlas of English History; Adams and Stephens, Select Documents of English Constitutional History.

* Absent on leave, 1902-03.

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3 hrs. throughout the year, M Tu W, 2. (Credit will be given for the work of the first half-year without the second, but not for the second half year without the first.)

53. History of Greece. Dr. FERGUSON.

From the earliest times till the death of Alexander the Great. A lecture course illustrated by lantern slides. The attempt is made to trace the artistic, intellectual, religious, social and economic, as well as political development of the Greek people.

3 hrs., first half-year. M W F, 3. Text-book, J. B. Bury's History of Greece.

54. History of Rome. Dr. FERGUSON.

From the earliest times till the death of Julius Cæsar. A lecture course treating of the rise, expansion, and downfall of the Roman Republic.

3 hrs., second half-year. M W F, 3. Text-book, How & Leigh's History of Rome.

64. History of the Middle Ages. Dr. LAPSLEY.

A general survey of the history of Western Europe from the establishment of the Roman Principate to the beginning of the Reformation Movement.

This course is intended for such Freshmen and Sophomores as wish to obtain a general acquaintance with Mediæval History, as well as for those who mean to proceed with the study of the Middle Ages in Courses 65 and 66, for which this will in future be made a prerequisite.

No text-book is used. Instruction will be by lectures and discussion based on the topical reading assigned from time to time.

3 hrs., throughout the year. M W F, 1.

FOR STUDENTS OF MORE ADVANCED STANDING.

(The year in which these courses may be taken is determined by the prerequisites.)

*55. Latin-American Colonization. Professor MOSES.

Spanish settlement and administration during the Colonial Period; the War of Independence; the political development of the Spanish-American Republics.

3 hrs., second half-year. Prerequisite: Any two courses.

*Not to be given in 1902-03.

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55A. **The History of English Expansion.** Professor STEPHENS.

A detailed discussion of colonies and dependencies of the British Empire.

3 hrs., throughout the year. M Tu W, 3. Prerequisite: Course 52, as hitherto given.

56. **The French Revolution.** Professor BACON.

The history of Europe from 1789 to 1815.

3 hrs., first half-year. M W F, 10. Prerequisite: Any one of the Freshman courses.

57. **Europe in the Nineteenth Century.** Professor BACON.

The political history of continental Europe from 1815 to the present time.

3 hrs., second half-year. M W F, 10. Prerequisite: Course 56.

59. **Constitutional History of England to 1485.** Dr. LAPSLEY.

A detailed study of the origin and growth of the Constitution and the principles of public law in England. Instruction will be by lectures, the translation and discussion of original authorities, a considerable amount of topical reading, and the preparation of two essays by each student. Every member of the class will provide himself with a copy of Stubbs's Select Charters.

This course is designed to be helpful to those who mean to study Law as well as to students of Constitutional History.

3 hrs., throughout the year. M W F, 2. Prerequisite: Two courses in History, including Course 52, as hitherto given.

*60. **Constitutional History of England since 1485.** Dr. LAPSLEY.

A detailed study of the development of constitutional government in England from the end of the Middle Ages to the present time.

3 hrs., throughout the year. M W F, 2. Prerequisite: Course 59.

61. **Greek Institutions.** Dr. FERGUSON.

The origin and working of the mechanism of government in typical oligarchic, democratic, federal, and monarchic states. International relations. The Greek theory of government.

2 hrs., first half-year. Tu Th, 1. Prerequisite: Courses 53 and 81.

* Not to be given in 1902-03.

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62. History of Rome. Dr. FERGUSON.

From the death of Julius Caesar till the death of Marcus Aurelius. In this course particular attention is paid to the social, economic, and religious condition of the people.

3 hrs., second half-year. M W F, 1. Prerequisite: Course 54.

62A. History of Rome. Dr. FERGUSON.

From the death of Marcus Aurelius till the accession of Odoacer. The disintegration of the Roman Empire and the decline of the culture of antiquity.

2 hrs., second half-year. Tu Th, 1. Prerequisite: Courses 54 and 62.

*65. Germany in the Middle Ages. Dr. LAPSLEY.

A study of its institutions, with a critical examination of the origin, organization, and influence of the Holy Roman Empire.

3 hrs., throughout the year. Prerequisite: Course 64, an ability to use Latin or German or French texts, and the consent of the instructor.

66. The Foundations of the French Monarchy. Dr. LAPSLEY.

A study of the growth of the French Nation from the close of the tenth until the beginning of the sixteenth century. This will naturally include the study of institutions both central and local as well as the political history of the period.

3 hrs., throughout the year, M W F, 9. Prerequisite: Any three courses in history, an ability to use Latin or German or French texts, and the consent of the instructor.

67. Comparative Constitutional Law. Professor BACON.

A comparative view of the development and present condition of the political institutions of the western nations.

3 hrs., first half-year. M W F, 9. Prerequisite: Any two courses.

68A. Eastern Europe. Professor BACON.

A study of the rise and development of Russia, and its relations with other nations in Europe and Asia.

2 hrs., second half-year. Tu Th, 9. Prerequisite: Any five courses.

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*71. **History of the United States since 1850.**
Assistant Professor BABCOCK.

A study of the overthrow of the slave power, the civil war, reconstruction, and the development of the resources of the country.

3 hrs., first half-year. Prerequisite: Course 72 or 73 and two other courses.

72. **English Colonies in America.** Assistant Professor BABCOCK.

A detailed study of colonial institutions and progress to the formation of the Constitution.

3 hrs., first half-year. M W F, 2. Prerequisite: One course in history.

73. **The United States under the Constitution, 1783–1850.**
Assistant Professor BABCOCK.

Special emphasis is laid on the constitutional and social develop ment.

3 hrs., second half-year. M W F, 2. Prerequisite: Two courses in history and at least Sophomore standing.

74. **Local Government and Administration, with Special Reference to Municipal Problems.** Assistant Professor BABCOCK.

3 hrs., second half-year, M W F, 1. Prerequisite: Four courses, including 72 or 73.

78. **History of the Political Theories of the Eighteenth Century.**
Assistant Professor BABCOCK.

A history of the political theories which influenced the institutions and revolutions of the eighteenth century.

2 hrs., first half-year. Tu Th, 11. Prerequisite: The same as for the Group Elective.

*80. **Territorial Expansion of the United States.** ——— ———

The settlement and political organization of Louisiana, Florida, Texas, and the region west of the Rocky Mountains, with a view of the events leading up to the several territorial accessions to the United States since 1783.

2 hrs., second half-year. Prerequisite: Course 72 or 73.

81. **History of Greece.** Dr. FERGUSON.

From the death of Alexander the Great till the death of Cleopatra. A history of the Greek people under federal and monarchical

*Not to be given in 1902–03.

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institutions; the spread of Greek culture in the East; the oriental reaction, the transition from Greece to Rome, and the decline of Greece.

3 hrs., first half-year. M W F, 2. Prerequisite: Course 53.

Text-book, Adolph Holm's History of Greece, vol. iv.

86. **Diplomatic History of the United States.**
Assistant Professor BABCOCK.

A study of the negotiations, treaties, arbitrations, and congresses in which the United States has been a party, 1776–1890.

3 hrs., first half-year. M W F, 1. Prerequisite: Any four courses, including Course 71 or 73.

87. **The Renaissance and Reformation.** Professor BACON.

The transition from mediæval to modern history.

3 hrs., second half-year. M W F, 10. Prerequisite: Any five courses.

*88. **Theories of Social Progress.** Professor MOSES.

A critical examination of the theories hitherto offered to explain the forces, methods, and aims of social progress.

2 hrs., first half-year.

*89. **Political Science.** Professor MOSES.

A course of graduate study in the science of Politics, including the history of political thought since the middle of the eighteenth century.

2 hrs., second half-year.

102. **The Art and Meaning of History.** Professor BACON.

A review of the progress of historical writing from the earliest times to the present; with an examination of the various attempts to interpret the deeper meanings of history, commonly called the philosophy of history.

2 hrs., first half-year. Tu Th, 9. Prerequisite: Twenty hours in History and Political Science. (Courses in Jurisprudence may be substituted in part for the prerequisite.)

103. **History of California.** Assistant Professor Babcock.

A discussion of the salient features of the settlement, conquest, and development of the State of California, with a critical examination of some of the sources.

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2 hrs., second half-year. Tu, Th, 11. Prerequisite: Three courses in history, including 71, 72, or 73.

104. The Teaching of History. Assistant Professor BABCOCK.

A discussion of the teaching of history in secondary schools, with special emphasis on the methods, courses, and materials. The course is designed primarily for seniors expecting to apply for a high school teacher's certificate in history.

1 hr., second half-year. S, 9. Prerequisite: Six courses, and at least Senior standing.

FOR GRADUATE STUDENTS.

82. Greek Epigraphy. Dr. FERGUSON.

The history of the Greek alphabet and the interpretation of the more important inscriptions of the Hellenistic period.

2 hrs., first half-year. Text-book: Dittenberger's Sylloge Inscriptionum Græcarum.

92. Investigation Course in the History of the United States. Assistant Professor BABCOCK.

A course in original research upon assigned topics, with weekly conferences with individual students.

2 hrs., throughout the year.

93. History of the Christian Church. Professor BACON.

The spread of Christianity, and the doctrine and polity of the Church.

2 hrs., throughout the year.

*94. History of Eastern Christendom. Professor BACON.

A critical study of the political, social, and religious institutions of the Eastern Christian nations.

2 hrs., throughout the year.

*94A. History of the English Administration in India. Professor STEPHENS.

2 hrs., throughout the year.

101. Special Study of a Period of Greek History. Dr. FERGUSON.

The Athenian Empire.

2 hrs., second half-year. Text-book: G. F. Hill's Sources of Greek History.

* Not to be given in 1902–03.

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105. **Early Hebrew History: Genesis to Joshua.** Dr. VAN KIRK.

A survey of the subject, with a view to the application of the methods of historical criticism to the Old Testament; to the study of the development of Hebrew religious ideas; and the intelligent reading of the English version of the Hebrew Scriptures.

2 hrs., first half-year. Tu Th, 10. Open to all students.

106. **Early Hebrew History: Judges to Kings.** Dr. VAN KIRK.

Similar in character to Course 105.

2 hrs., second half-year. Tu Th, 10. Open to all students.

NOTE.—Beginning in 1903-04 Professor Stephens will give a course in general European History from 1648. History 52 will be prerequisite to this course.

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POLITICAL ECONOMY.

ADOLPH C. MILLER, Ph.D., Professor of Political Economy and Commerce.

CARL C. PLEHN, Ph.D., Associate Professor of Finance and Statistics.

THOMAS W. PAGE, Ph.D., Assistant Professor of History and Economics.

LINCOLN HUTCHINSON, M.A., Instructor in Commercial Geography.

ERNEST C. MOORE, Ph.D., Instructor in Education.

Group Elective. Prerequisite: Any three courses in Political Economy, or any two courses in Political Economy and one course in History.

PRIMARILY FOR FIRST-YEAR STUDENTS.

1. **Introduction to Economics.**
Assistant Professor PAGE and Mr. HUTCHINSON.

A study of the elementary laws of economics as illustrated in the growth of industry and commerce.

3 hrs., either half-year. First half-year: two sections, M W F, 1; second half-year: one section, M W F, 2.

2. **Theoretical Economics.** Associate Professor PLEHN.

A continuation of Course 1, with a general survey of the principles and laws of economic science.

3 hrs., either half-year. M W F, 3. Prerequisite: Course 1.

3. **Economic Geography, First Course: Introduction to Economic Geography.** Mr. HUTCHINSON.

The elements of scientific geography; relation between geographical phenomena and economic development; resources of the leading countries of the world.

3 hrs., each half-year. Tu Th S, 10.

FOR STUDENTS OF MORE ADVANCED STANDING.

4. **Economic Geography, Second Course: Geography of International Commerce.** (G.E.) Mr. HUTCHINSON.

Demand and supply in the world's markets; geographical distribution of the more important articles of commerce; routes and means of transportation and communication; etc.

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3 hrs., second half-year. Tu Th, 2; S, 9. Prerequisite: Course 3.

5. **Economic History: Western Civilization in its Economic Aspects from 1066 to 1763.** (G.E.) Assistant Professor PAGE.

3 hrs., first half-year. M W F, 2. Prerequisite: Course, 1 and two courses in History.

6. **Economic History: Economic and Social History of the English Colonies in America.** (G.E.) Assistant Professor PAGE.

2 hrs., second half-year. Tu Th, 2. Prerequisite: Course 1, and one course in English or American History.

7. **Modern Industrialism.** (G.E.) Professor MILLER.

A descriptive account of the development of the industry and commerce of Europe and America since the middle of the eighteenth century. Lectures and reading.

3 hrs., throughout the year. M W F, 9. Prerequisite: The same as for the Group Elective.

8. **Money and Banking.** (G.E.) Professor MILLER.

Theory and practice of money, banking, and exchange.

3 hrs., second half-year. M W F, 10. Prerequisite: The same as for the Group Elective, and at least Junior standing.

9. **Public Finance.** (G.E.) Associate Professor PLEHN.

Public expenditures, revenues, and debts, with special reference to the problems of taxation in the United States, and a thorough study of the tax laws of California.

3 hrs., first half-year. M W F, 2. Prerequisite: Course 2.

10. **Statistics, First Course: History, Theory, and Practice of Statistics.** (G.E.) Associate Professor PLEHN.

2 hrs., first half-year. Tu Th, 11: Prerequisite: Course 2. Course 20A in Mathematics should be taken in conjunction with this course.

11. **Statistics, Second Course: Special Problems.** (G.E.) Associate Professor PLEHN.

Special problems in statistical practice; investigations, and analysis of results; insurance and similar subjects.

2 hrs., second half-year. Tu Th, 11. Prerequisite: Course 10.

12. **Economic History: The Growth of Industry and Commerce in the United States.** (G.E.) Assistant Professor PAGE.

3 hrs., second half-year. M W F, 1. Prerequisite: Course 1 and one course in United States History.

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FOR GRADUATES AND ADVANCED UNDERGRADUATES.

13. **Economic History: A Study of the Development of International Commerce and of Commercial Policies in the Nineteenth Century.** (G.E.) Assistant Professor PAGE.

2 hrs., first half-year. Tu Th, 2. Prerequisite: The same as for the Group Elective, and at least Senior standing.

14. **Corporation Finance and Accounting.** (G.E.) Associate Professor PLEHN.

3 hrs., second half-year. M W F, 2. Prerequisite: The same as for the Group Elective, and at least Junior standing.

15. **Financial History of the United States.** (G.E.) Professor MILLER.

A detailed study of the experiences and legislation of the United States touching currency, coinage, banking, debt, and taxation. The study will be based, as far as possible, upon first-hand examination of sources. Lectures and reports.

3 hrs., first half-year. M W F, 10. Prerequisite: The same as for the Group Elective, and at least Senior standing.

16. **History of Economics.** (G.E.) Professor MILLER.

An account of the development of economic thought, especially in modern times. Lectures and reading.

2 hrs., first half-year. M F, 2. Prerequisite: The same as for the Group Elective, and at least Senior standing.

17. **Commercial Geography, Third Course: Commercial Resources of the Spanish-American Countries.** (G.E.) Mr. HUTCHINSON.

Detailed study of the geography, natural resources, commerce, and possibilities of development of these countries, devoting a year to each. In 1902–03 Brazil will be studied. Particular attention is given to commercial relations with the United States.

2 hrs., throughout the year. Tu Th, 11. Open only to advanced students who satisfy the instructor as to their fitness for the work. A reading knowledge of Spanish is highly desirable.

18. **Methods of Modern Charities and Corrections: Theoretical.** Dr. MOORE.

Studies in the administration of poor relief, the treatment of delinquents and defectives. Readings and lectures.

2 hrs., first half-year. Tu Th, 2. Prerequisite: Course 1 and Philosophy 2. Class to be limited at the discretion of the instructor

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19. Methods of Modern Charities and Corrections: Investigation.

Dr. MOORE.

Investigation and field work to be done in part in connection with the Associated Charities of San Francisco and Oakland.

2 hrs., second half-year. Tu Th, 2. Prerequisite: Course 18.

20. Unsettled Problems of Economic Theory. (G.E.)

Professor MILLER.

Critical and constructive work in the economics of value and distribution. Reading and discussion.

2 hrs., second half-year. M F, 2. Consent of instructor necessary.

FOR GRADUATE STUDENTS.

Instructors will assist graduate students to pursue research work in any of the above subjects, for which appropriate credit will be granted. Such work may be done in direct connection with the regular class-room work or separately therefrom.

21. American Taxation: Federal and State.

Associate Professor PLEHN.

2 hrs., throughout the year.

22. Sources of Information Relating to Commerce.

Mr. HUTCHINSON.

The object of this course is to familiarize the student with the most reliable sources of information; government reports, statistical publications, chambers of commerce journals, bulletins of commercial museums, etc.

1 or 2 hrs., throughout the year.

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ANTHROPOLOGY.

ALFRED L. KROEBER, Ph. D., Instructor in Anthropology.

PLINY E. GODDARD, M.A., Assistant in Anthropology.

The archæological researches for the University of California, which, through the munificence of Mrs. Phœbe A. Hearst, have been in progress for some years in various parts of the world, have grown to such extent, diversity, and importance, that for their better direction and coördination a Department of Anthropology has been constituted by the Regents.

An Advisory Committee will direct the work of the department. Dr. Frederic W. Putnam, Peabody Professor of American Archæology and Ethnology and Curator of the Peabody Museum of Harvard University, and Curator of the Department of Anthropology in the American Museum of Natural History of New York, is Chairman of the committee. The other members are Dr. Franz Boas, Professor of Anthropology in Columbia University, Curator of the Department of Ethnology of the American Museum of Natural History of New York, and Honorary Assistant in Charge of Linguistics of the Bureau of American Ethnology, Washington; Mrs. Zelia Nuttall, Honorary Assistant in Mexican Archæology in the Peabody Museum; Miss Alice Cunningham Fletcher, Thaw Fellow and Assistant in American Ethnology in the Peabody Museum; Dr. John C. Merriam, Assistant Professor of Palæontology and Historical Geology, Secretary of the committee; President Wheeler, and Mrs. Hearst. Mr. G. J. M. E. d'Aquin is Assistant Secretary and Executive Officer.

For the present the department will be mainly one of research. The expeditions and purchasing agents at work in many lands have already collected much important and valuable material.

Short courses of public lectures on anthropological subjects will from time to time be given at the University by members of the department and by visiting anthropologists.

1 North American Ethnology. Dr. KROEBER.

2 hrs., second half-year.

Prospective students should consult the instructor.

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2. **Tribes of Northwestern California.** Mr. GODDARD.

A course of lectures on the arts, manner of life, and social customs of the Hupa culture area, followed by an examination of the myths of the region. The abundant material in the museum will be used for illustration.

2 hrs., second half-year.

Geological History of Man. [See Geology 14].
Assistant Professor MERRIAM.

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LINGUISTICS.

BENJ. IDE WHEELER, Ph.D., LL.D., President of the University.

HUGO KARL SCHILLING, Ph.D., Professor of the German Language and Literature.

ALEXIS F. LANGE, Ph.D., Associate Professor of English and Scandinavian Philology.

MAX L. MARGOLIS Ph.D., Associate Professor of the Semitic Languages.

GUSTAVE FAUCHEUX, Bachelier ès Lettres, Bachelier ès Sciences, Instructor in French.

T. STANLEY SIMONDS, Ph.D., Instructor in Latin.

1. General Introduction to the Science of Language. (G.E.) Dr. WHEELER.

The essential principles of the life and growth of language; outlines of the science of Phonetics; history of the science of comparative philology; historical and ethnological results of the science; classification of languages; salient characteristics of the various branches of the Indo-European family of languages; methods of investigation.

A course intended for prospective teachers of languages. May be counted as G.E. in any language.

2 hrs., first half-year. Tu Th, 9. Open to Seniors and Graduates.

2. Indo-European Comparative Grammar. (G.E.) Dr. WHEELER.

With special reference to the Germanic, Greek, and Latin languages.

A course intended for prospective teachers of languages. May be counted as G.E. in any language.

2 hrs., second half-year. Tu Th, 9. Open to Seniors and Graduates.

*3. The Relationship of the Indo-European, Semitic, and Egyptian Families of Languages. (G.E.) [Announced in 1901–02 as Semitic Languages 21.] Associate Professor MARGOLIS.

The criteria of the affinity of languages. Agglutinative inflection: The structure of the Indo-European languages. Internal inflection: the structure of the Semitic languages. The Egyptian

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language. The three groups compared in regard to grammar, phonetic development, and vocabulary.

1 hr., throughout the year. Tu, 4. Primarily for Graduates. Knowledge of a Semitic language is not required. Familiarity with one classical language is essential.

5. Fundamental Problems of Linguistics.

Associate Professor MARGOLIS.

On the basis of Delbrück's "Grundfragen der Sprachforschung" interpretation of selected chapters from the works of Humboldt, Steinthal, Geiger, Wegener, von der Gabelentz, Jespersen, Paul, Wundt, Mauthner.

1 hr., throughout the year. Th, 3. Primarily for Graduates.

4. Elementary Sanskrit. [Announced in 1901–02 as Latin 65.]

Dr. SIMONDS.

Perry's Primer, and Lanman's Reader.

2 hrs., throughout the year. Tu Th, 4.

Old English. [See English 5A.]

Associate Professor LANGE and Dr. NOYES.

Modern English Phonology. (G.E.) [See English 14A.]

Associate Professor LANGE.

*Old Norse. [See English 30.] Associate Professor LANGE.

Historical German Grammar. (G.E.) [See German 12.]

Professor SCHILLING.

*Introduction to Germanic Philology: Phonology, Morphology; Gothic. [See German 13.] Professor SCHILLING.

Romanic Philology. [See Romanic Languages 26.]

Mr. FAUCHEUX.

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* Not to be given in 1902–03.

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SEMITIC LANGUAGES.

JACOB VOORSANGER, D.D., Professor of the Semitic Languages and Literatures.

MAX L. MARGOLIS, Ph.D., Associate Professor of the Semitic Languages.

SEMITIC LANGUAGES IN GENERAL.

1. General Introduction to the Study of the Semitic Languages. (G.E.) Associate Professor MARGOLIS.

Lectures on the nature and classification of the Semitic languages, and a general survey of the history and literatures of the Semites.

1 hr., throughout the year. Tu, 3. This course is open to Juniors and Seniors; other students must obtain the permission of the instructor before registering. The course will count as graduate work to graduates pursuing a definite line of reading under the direction of the instructor.

*The Relationship of the Indo-European, Semitic, and Egyptian Families of Languages. (G.E.) [See Linguistics 3.] Associate Professor MARGOLIS.

COURSES IN BIBLICAL AND RABBINIC HEBREW. OLD TESTAMENT EXEGESIS AND HISTORY.

3. Hebrew. (G.E.) Associate Professor MARGOLIS.

First Course: Grammatical interpretation of the Book of Ruth, preceded by an outline of Hebrew accidence. Text-books: Hebrew Bible, ed. Hahn; Gesenius's Hebrew Lexicon, ed. Brown-Briggs-Driver.

3 hrs., throughout the year. Tu W Th, 4. Prerequisite: At least Junior standing.

*4. Hebrew. (G.E.) Associate Professor MARGOLIS.

Second Course: Continued reading of selected portions of the Old Testament. Text-book: Gesenius-Kautzsch, Hebrew Grammar, Clarendon Press.

3 hrs., first half-year. M, 11; W Th, 8. Prerequisite: At least Senior standing.

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*6B. Hebrew. Associate Professor MARGOLIS.

Third Course: A thorough study of certain paragraphs of Gesenius-Kautzsch; exercises in reading unpointed texts and in translation from English into Hebrew.

2 hrs., first half-year. Tu, 10–12. Primarily for Graduates.

7. Hebrew. Professor VOORSANGER.

Fourth Course: Reading of the Minor Prophets.

2 hrs., throughout the year. Tu, 9–11. Primarily for Graduates.

6C. Exegetical Course. Associate Professor MARGOLIS.

Philological interpretation of Genesis. Text-book: Gunkel's Genesis, 1901.

2 hrs., throughout the year. M, 3–5. Primarily for Graduates. Open to Seniors possessing a knowledge of Greek.

20. The Septuagint. (G.E.) Associate Professor MARGOLIS.

History of the Septuagint and its text. The Septuagint dialect and its relation to classical Greek on the one hand, and to New Testament Greek on the other. Reading of the Book of Daniel in the third volume of Swete's Old Testament in Greek.

1 hr., throughout the year. W, 3. Prerequisite: At least Junior standing.

7A. Biblical Archaeology. (G.E.) Professor VOORSANGER.

Lectures on the languages, customs, civil institutions, religions, etc., of the nations and peoples of the Old Testament, with especial reference to the historical development of the religious and political institutions of the Jewish people.

2 hrs., throughout the year. Tu, 1–3. Open to all students of the University.

Early Hebrew History: Genesis to Joshua. Dr. VAN KIRK.

(See History 105.)

Early Hebrew History: Judges to Kings. Dr. VAN KIRK.

(See History 106.)

8. The Mishna. Professor VOORSANGER.

Reading of the treatise Taanith, preceded by a general introduction to Rabbinic literature.

1 hr., throughout the year. Tu, 11. Primarily for Graduates.

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COURSES IN ARAMAIC AND SYRIAC.

*10. Biblical and Targumic Aramaic.
Associate Professor MARGOLIS.

Selections from the Aramaic portions of the Old Testament and from the Targumim. Text-books: Marti's Grammatik der bibl.-aram. Sprache; Merx, Chrestomathia Targumica.

3 hrs., second half-year. M, 11; W T, 8. Primarily for Graduates.

*11. Syriac I. Associate Professor MARGOLIS.

Text-book: Brockelmann's Syrische Grammatik.

2 hrs., throughout the year. Tu, 11–1, Primarily for Graduates.

12. Syriac II. Associate Professor MARGOLIS.

Rapid reading of the New Testament and the Psalms, with reference to Nöldeke's Syrische Grammatik.

2 hrs., throughout the year. M, 11–1. Primarily for Graduates.

12A. Talmudic Aramaic. Associate Professor MARGOLIS.

Interpretation of consecutive parts of Sanhedrin, Babylonian recension. Attention will be paid to exegesis and methodology. Text-books: Strack, Einleitung in den Thalmud; Mielziner, Introduction to the Talmud.

2 hrs., throughout the year. Tu, 11–1. Primarily for Graduates.

COURSES IN ARABIC AND ETHIOPIC.

*13. Arabic I. Associate Professor MARGOLIS.

Grammatical interpretation of selected suras, preceded by an outline of Arabic accidence; translation from English. Text-books: Socin's Arabic Grammar; Nallino's chrestomathia corani.

2 hrs., throughout the year. Tu, 2–4. Primarily for Graduates.

14. Arabic II. Associate Professor MARGOLIS.

Rapid reading of the Koran, with references to Wright's Arabic Grammar.

2 hrs., throughout the year. M, 9–11. Primarily for Graduates.

*15. Arabic III. Associate Professor MARGOLIS.

First half-year: Interpretation of selected portions of Baidhawi's Commentary on the Koran. Second half-year: Interpretation of the Muallakat (ed. Abel).

2 hrs., throughout the year. Primarily for Graduates.

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16. Ethiopic. Associate Professor MARGOLIS.

Grammatical interpretation of the Ascension of Isaiah, ed. Charles based on Praetorius' Aethiop. Grammatik.

1 hr., throughout the year. M, 2. Primarily for Graduates.

COURSES IN ASSYRIAN.

17. Elementary Course. Associate Professor MARGOLIS.

Selected inscriptions in Delitzsch's Assyrische Lesestücke, fourth edition, on the basis of his Assyrian Grammar and Assyrisches Handwörterbuch.

2 hrs., throughout the year. Tu, 9–11. Primarily for Graduates.

18. Advanced Course. Associate Prof. MARGOLIS.

Interpretation of the Nimrod epic in Haupt's edition.

2 hrs., throughout the year. Time to be agreed upon. Primarily for Graduates.

SEMITIC EPIGRAPHY.

*19. Phœnician Inscriptions. Associate Professor MARGOLIS.

Interpretations of selected Phœnician inscriptions, preceded by a history of the alphabet.

1 hr., second half-year. Primarily for Graduates.

COPTIC.

22. Elementary Course: The Sahidic Dialect.
Associate Professor MARGOLIS.

Text-books: Steindorff, Koptische Grammatik; Ciasca, Sacrorum Bibliorum Fragmenta Copto-Sahidica; Peyron, Lexicon.

1 hr., throughout the year. Tu, 2. Primarily for Graduates.

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*Not given in 1902–3.

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ORIENTAL LANGUAGES.

JOHN FRYER, LL.D., Agassiz Professor of Oriental Languages and Literatures.

WALTER N. FONG, A.B., Chinese Assistant.

YOSHI S. KUNO, M.S., Japanese Assistant.

In addition to the lecture and language courses given below, Professor Fryer will offer assistance to students who wish to take up other branches of study connected with China and Japan. He will also act as adviser to students coming from or going to the Orient.

Some of these Group Elective courses are accepted by the College of Commerce and other colleges as part of the regular curriculum or as substitutes for prescribed work. Graduates and undergraduates wishing to take up these Oriental studies, may therefore find it to their advantage to consult with the Dean of their college as to the arrangements that can be made in that direction.

LECTURE COURSES.

FOR GRADUATES AND UNDERGRADUATES.

*1. The History, Languages, and Literatures of China and Japan. (G.E.) Professor FRYER.

A course of lectures adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., first half-year. M W F, 4.

*11. The Laws, Government and Social Conditions of China and Japan. (G.E.) Professor FRYER.

A course of lectures adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., second half-year. M W F, 4.

1A. The Commerce of China and Japan. (G.E.) Professor FRYER.

A course of lectures on the historical and geographical features of the commerce of China and Japan, adapted for students in general, but particularly for those in the College of Commerce.

3 hrs., first half-year. M W F, 1.

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11A. **The Commerce of China and Japan.** (G.E.) Professor FRYER.

A course of lectures on the economic and political features of the commerce of Japan and China, adapted for students in general but particularly for those in the College of Commerce.

3 hrs., second half-year. M W F, 1.

2. **The Philosophies and Religions of China.** (G.E.) Professor FRYER.

A course of lectures on Confucianism and Taoism, adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., first half-year. M W F, 4.

12. **The Philosophies and Religions of China.** (G.E.) Professor FRYER.

A course of lectures on Buddhism, Mohammedanism, and other religions in China, adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., second half-year. M W F, 4.

*12A. **The Philosophies and Religions of Japan.** (G.E.) Professor FRYER.

A course of lectures on the principal religions and philosophies of Ancient and Modern Japan, adapted for students in general as well as for those who look forward to relations with the Orient.

3 hrs., first half-year. M W F, 4.

2A. **Chinese Classical Literature.** (G.E.) Professor FRYER.

A critical study of selections from English translations of the principal classical books of China.

1 hr., throughout the year, M, 11. Prerequisite: Junior standing.

LANGUAGE COURSES.

FOR GRADUATES AND UNDERGRADUATES.

3. **Elementary Study of Kuan-hua.** (G.E.) Professor FRYER.

Introduction to Kuan-hua, the language spoken by the officials and about four-fifths of the population of China. Series of progressive elementary lessons and exercises in reading, speaking, translation, and composition.

3 hrs., throughout the year. M W F, 10.

* Not to be given in 1902–03.

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*4. Advanced Study of Kuan-hua. (G.E.) Professor FRYER.

Series of progressive advanced lessons and exercises in reading, speaking, translation, and composition. Selections from Kuan-hua literature.

3 hrs., throughout the year. M W F, 9. Prerequisite: Course 3.

5. Elementary Study of Wen-li. (G.E.) Professor FRYER.

The classical written language of the empires of China and Japan. Progressive selections from various kinds of current literature and official documents, with exercises in translation and composition. Selections from the Four Books.

The Cantonese section is taught by Mr. FONG and the Japanese by Mr. KUNO.

3 hrs., throughout the year. Prerequisite: Course 4, 8, or 10.

6. Advanced Study of Wen-li. (G.E.) Professor FRYER.

Progressive selections from the higher classical literature, with exercises in translation and composition. Selections from the Five Classics, essays, technical books, and poetry.

The Cantonese section is taught by Mr. FONG and the Japanese by Mr. KUNO.

3 hrs., throughout the year. Prerequisite: Course 5.

7. Elementary Study of the Cantonese Dialect. (G.E.) Mr. FONG.

Introduction to Cantonese, the dialect spoken by the greater part of the Chinese who emigrate to America, Australia, and other countries. Series of progressive elementary lessons and exercises in speaking, reading, translation, and composition.

3 hrs., througnout the year. M W F, 9.

8. Advanced Study of the Cantonese Dialect. (G.E.) Mr. FONG.

Series of progressive advanced lessons and exercises in speaking, reading, translation, and composition. Selections from literature in the Cantonese dialect.

3 hrs., throughout the year. Prerequisite: Course 7.

9. Elementary Study of the Japanege Language. (G.E.) Mr. KUNO.

Introduction to the Japanese language, with the use of both the Katakana and Hiragana forms of letters. Series of progressive elementary lessons and exercises in reading, speaking, and writing.

3 hrs., throughout the year. M W F, 9.

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10. **Advanced Study of the Japanese Language.** (G.E.) Mr. KUNO.

Series of progressive advanced lessons and exercises in reading, speaking, translation, and composition, with selections from the best Japanese literature.

3 hrs., throughout the year. M W Th, 11. Prerequisite: Course 9.

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GREEK.

*EDWARD B. CLAPP, Ph.D., Professor of the Greek Language and Literature.

ISAAC FLAGG, Ph.D., Associate Professor of Greek.

JAMES T. ALLEN, Ph.D., Instructor in Greek and Classical Archæology.

WILLIAM S. FERGUSON, Ph.D., Instructor in Greek and Roman History.

HENRY W. PRESCOTT, Ph.D., Instructor in Latin.

WILLIAM P. DREW, A.B., B.D., Reader in Greek.

Students who enter the University with credit for Matriculation Subjects 8 and 9 will be admitted to Greek 2 in the Freshman year.

Students who offer only Matriculation Subject 8 will be admitted to a new Freshman course [to be established], which will cover the work of Matriculation Subject 9 in one year at the rate of three exercises a week. This will prepare them to take up Greek 2 in the Sophomore year. Such students will still be able to take their Group Elective in Greek, and to receive a teacher's recommendation at graduation.

Students who bring no Greek to the University, but who wish to begin the study in the University, will be provided for, in the year 1902–1903, in a private class with a moderate tuition fee. It is the intention of the University to offer regular [free] instruction in Elementary Greek beginning with the year 1903–04.

Courses 2 and 1A are prescribed, in the Freshman year, to students in the College of Letters who have credit for Matriculation subject 9.† But specially competent students may be assigned to Course 1 in place of Course 1A. Course 1 is also elective, when taken in addition to other work in Greek, to students who wish to devote more than one half-year to Homer. In this course the most important parts of the Iliad and Odyssey are read in two successive years.

The Group Elective. Prerequisite to the Group Elective are: Courses 1A (or 1), 2, and any one of Courses 7A, 9B, and 11A. The

*Absent on leave in 1902–03. Inquiries concerning the work of the department may be addressed to Dr. Allen.

†Courses for students who have credit for Matriculation subject 8 only, as well as for those who wish to begin the study of Greek in the University, will be included in the ANNOUNCEMENT for 1903–04.

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other two of the last named three courses (after one of them has been taken) may be included in the Group Elective. Students who desire to take the whole of their Group Elective in Greek may include in the Group courses in Sanskrit, Greek Philosophy, and Greek History.

Teachers' Certificates. Students will be recommended for teachers' certificates who, at graduation, or after, shall have completed with credit Course 6B, together with twelve units of work selected from Courses 20 to 39 in Greek. Graduate students will be recommended on proof of having creditably completed work equal in extent to that required of undergraduates.

PRESCRIBED COURSES.

2. **Plato's Apology.** Associate Professor FLAGG and Dr. ALLEN.

This course is intended to carry forward the student's training in the vocabulary, syntax, and style of Attic prose, without, however, neglecting the historical and literary questions involved in the study of the Apology.

3 hrs., first half-year. M W F. Section I, 8; II, 9; III, 10.

1A. **Homer's Iliad—Books xix–xxiv.** Dr. ALLEN.

In this course much attention is given to accurate translation and correct metrical reading of the Greek. Seymour's Introduction to the Language and Verse of Homer is studied in connection with the text.

3 hrs., second half-year. M W F. Section I, 8; II, 9.

1. **Homer.** Associate Professor FLAGG.

Rapid reading, with intensive study of selected passages. Written tests in translation at sight. In 1902–03, the Odyssey.

3 hrs., second half-year. M W F, 10. Prerequisite: First or second grade of scholarship in Course 2.

ELECTIVE COURSES.

3C. **The Writing of Attic Prose.** Associate Professor FLAGG.

Exercises in writing Greek at hearing, and in prose composition, based mainly upon Xenophon.

1 hr., first half-year. S, 8. An elective course, designed for Freshmen in the College of Letters who intend to continue their Greek studies beyond the prescribed minimum.

3D. **The Writing of Attic Prose.** Associate Professor FLAGG.

A continuation of Course 3C.

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1 hr., second half-year. S, 8. Prerequisite: Creditable standing in 3C.

4A. **The Writing of Attic Prose.** Associate Professor FLAGG.

1 hr., first half-year. S, 9. Prerequisite: Creditable standing in 3D.

6B. **The Writing of Attic Prose.** Associate Professor FLAGG.

Translation from Latin into Greek.

1 hr., second half-year. S, 9. Prerequisite: Creditable standing in 4A.

9B. **Plato's Apology.** (G.E.)* Dr. ALLEN.

A study of the life and character of Socrates, with some attention to the history of the earlier Greek philosophy. [The Philippics of Demosthenes are usually read in this course, but the Apology is offered for 1902–03, since the students for whom the course is designed did not have the opportunity to read the Apology in their freshman year.]

3 hrs., first half-year. M W F, 10. Prerequisite: Courses 1A (or 1) and 2.

11A. **Greek Historical Prose.** (G.E.)* Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight.

3 hrs., first half-year. M W F, 9. Prerequisite: Courses 1A (or 1) and 2.

7A. **Introduction to Greek Tragedy.** (G.E.)† Dr. ALLEN.

The Alcestis of Euripides, and the Prometheus of Aeschylus, with practice in the intelligent reading of the trimeters and anapaests. In connection with this course a series of informal lectures will be given, on the representation of Greek dramas, and on the artistic form and structure of Greek Tragedy.

3 hrs., second half-year. M W F, 10. Prerequisite: Courses 1A (or 1) and 2.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES.

The following more advanced courses are open to graduates, and to undergraduates who have completed at least three of Courses 1, 1A, 2, 7A, 9B, 11A (if Course 7A is not one of the three, it must be taken with

* May be included in the Group Elective only if preceded by Course 7A.

†May be included in the Group Elective only if preceded by Course 9A, or 11.

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the first advanced course chosen), and such other preliminary work as may be called for in the statements under the several courses.

23. The Oration of Demosthenes on the Crown. (G.E.)
Dr. PRESCOTT.

2 hrs., second half-year. M W, 9.

28. Lyric Poetry. (G.E.) Dr. PRESCOTT.

Reading of the chief lyric poets, except Pindar, and including Alcman, Alcaeus, Sappho, Stesichorus, Anacreon, Simonides, and Bacchylides. Lectures on the beginnings and the development of lyric poetry.

2 hrs., first half-year. W F, 2.

32. Selections from Attic Orators. (G.E.)
Associate Professor FLAGG.

2 hrs., first half-year. Tu Th, 10. Special prerequisite: Course 6B.

33. The Phaedo of Plato. (G.E.) Dr. PRESCOTT.

2 hrs., first half-year. M W, 9.

34A. Plutarch's Themistocles. (G.E.) Dr. FERGUSON.

An historical study of the life of Themistocles, based principally on Plutarch, but with constant reference to his sources.

2 hrs., first half-year. Tu Th, 2.

30. Theocritus, Bion, and Moschus. (G.E.) Dr. PRESCOTT.

Reading of the bucolic idylls and the mimes of Theocritus, with comparative study of the idylls of Bion and Moschus, and of the mimes of Herondas. Lectures on the beginnings and the development of Greek bucolic poetry.

2 hrs., second half-year. M F, 2.

31. Herodotus. (G.E.) Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight.

3 hrs., second half-year. M W F, 9.

26. The Protagoras and the Laches of Plato. (G.E.)
Associate Professor FLAGG.

2 hrs., second half-year. Tu Th, 10. Special prerequisite: Course 6B.

34B. Plutarch's Pericles. (G.E.) Dr. FERGUSON.

An historical study of the life of Pericles, based principally on Plutarch, but with constant reference to his sources.

2 hrs., second half-year. Tu Th, 2.

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39A. Greek Comedy. (G.E.) Dr. PRESCOTT.

2 hrs., first half-year. Th S, 10.

39B. Greek Comedy. (G.E.) Dr. PRESCOTT.

Continuation of Course 39A.

2 hrs., second half-year. Th S, 10.

*38. Greek Syntax. (G.E.) Dr. ALLEN.

A discussion of problems of general syntax, followed by a survey of the syntax of the Greek moods and tenses, based mainly upon Homer. Lectures, with collateral reading and investigation of special topics.

2 hrs., second half-year. Tu Th, 2. Prerequisite: At least Senior standing.

The Septuagint [See Semitic 20.] (G.E.)
Associate Professor MARGOLIS.

Plato and Aristotle. [See Philosophy 16.] (G.E.)
Associate Professor BAKEWELL.

GREEK HISTORY AND INSCRIPTIONS.

The following courses in Greek History and Inscriptions, given under the supervision of the Department of History and Political Science, are of special importance to students of Greek. For details, prerequisites, etc., see under History.

History of Greece to the Death of Alexander the Great. [See History 53.] Dr. FERGUSON.

Greek Institutions. [See History 61.] Dr. FERGUSON.

History of Greece from the Death of Alexander the Great. [See History 81.] Dr. FERGUSON.

Greek Epigraphy. (G.E.) [See History 82.] Dr. FERGUSON.

Special Study of a Period of Greek History. [See History 101.]
Dr. FERGUSON.

*41A. Introduction to Greek and Roman Sculpture. (G.E.)
Dr. ALLEN.

A course of lectures upon the history of Classical Sculpture, with special attention to the characteristics of successive periods as reflecting contemporary national life and thought.

* To be given in 1903–04.

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*43A. Topography and Monuments of Ancient Athens. (G.E.)
Dr. ALLEN.

1 hr., second half-year. F, 10.

COURSES FOR GRADUATES.

The following courses are intended for graduate students only, and one or more of them will be given each year, according to the needs of students. Many graduate students will find it profitable to take also some of the advanced courses for undergraduates (Courses 20 to 49).

53. Aeschylus. Dr. ALLEN.

In this course it is expected that each student, so far as possible, will thoroughly read the extant dramas of the poet; and gain an acquaintance, at first hand, with the chief questions, textual, historical, and literary, which are involved in the study. Special investigation of important topics will be carried on by the students individually, leading to the preparation of original papers.

4 hrs., throughout the year. W F, 4–6.

*52. The Odes and Fragments of Pindar. Professor CLAPP.

Historical, literary, and metrical studies, and textual criticism.

4 hrs., throughout the year.

For additional graduate courses in Greek, see History 82 and 101.

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*Not to be given in 1902–3, but to be given in 1903–04.

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LATIN.

WILLIAM A. MERRILL, Ph.D., L.H.D., Professor of the Latin Language and Literature.

MARTIN KELLOGG, LL.D., Professor of Latin, Emeritus.

LEON J. RICHARDSON, A.B., Assistant Professor of Latin.

STANLEY SIMONDS, Ph.D., Instructor in Latin.

CLIFTON PRICE, Ph.D., Instructor in Latln.

HERBERT C. NUTTING, Ph.D., Instructor in Latin.

HENRY W. PRESCOTT, Ph.D., Instructor in Latin.

JOHN W. BASORE, Ph.D., Instructor in Latin.

MONROE E. DEUTSCH, A.B., Assistant in Latin.

WINTHROP L. KEEP, M.A., Reader in Latin.

The Latin work of the first and second years is normally continuous, and no part of it intended to count for prescribed work should be postponed by regular students to later years of residence. Courses 3 to 11, inclusive, may be counted for the prescribed or free elective work in the Colleges of General Culture, and as a free elective in other colleges, subject to their regulations. Four courses, and no more, may be selected from Courses 5 to 11; and they may not be taken in conjunction with, or subsequent to, Courses 12 to 60.

The Group Elective. Course 4 is prerequisite to the Group Elective in Latin. [After August, 1903, six units of German, six units of French, (or their Matriculation equivalents,) and a course in Roman History, will also be required.] The completed Group Elective must show an acquaintance from Latin sources with the condition of the language before Cicero and after Augustus; and the authors selected should represent approximately equally poetry and prose. Group Elective schedules, when determined upon, should be submitted to the head of the department for criticism.

Teachers' Certificates. The requirements for recommendation by the department are in all cases the equivalent of graduation with at least twelve units of Group Elective work in Latin, with the prerequisite for the Group.

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PRELIMINARY COURSES.

A. Virgil's Aeneid; Cicero's Orations.

Dr. NUTTING and Dr. BASORE.

3 hrs., throughout the year. Two sections. Tu Th S, 8. M W F, 9. Prerequisite: Matriculation subject *7a*. Six books of the Aeneid will be read, and the Oration for Milo, and the Fourteenth Philippic. May be counted for prescribed or free elective work, in all colleges, subject to their regulations, by students who enter with three years Latin only. It is identical with matriculationsubject *7b*, revised.

B. Latin Composition. Dr. NUTTING.

1 hr., throughout the year; ½ unit each half-year. S, 10. Prerequisite: Matriculation subject *6b*. May be counted for prescribed or free elective work, in all colleges, subject to their regulations. It is identical with the requirement in Composition of either subject *7a* or *7b*, revised.

1. Cicero and Pliny.

Dr. SIMONDS, Dr. PRICE, Dr. NUTTING, and Dr. BASORE.

The Cato Maior of Cicero and the Letters of Pliny. Systematic study of syntax and synonyms. Practice in reading aloud and in translation at hearing, and in pronunciation, phrasing and emphasis.

3 hrs., either half-year. First half-year, seven sections. M W F, 8, 9, 10, 3; Tu Th S, 8, 9. Second half-year, one section. M W F, 2.

Prerequisite: Subject *7b* of the revised admission requirements, or Course A. Prescribed in the College of Letters. May be counted for prescribed or free elective work in the Colleges of Social and Natural Sciences, and as a free elective in other colleges, subject to their regulations.

1B. Sight Translation. Assistant Professor RICHARDSON.

Practice in reading at sight from easy authors, with incidental interpretation.

1 hr., throughout the year; ½ unit each half-year. Tu, 2. Prerequisite: Contemporary registration in Course 1 or 2. This course may be counted for prescribed or free elective work at the option of the student.

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2. **Livy and Plautus.**

Dr. SIMONDS, Dr. PRICE, Dr. NUTTING, and Dr. BASORE.

Selections from Livy, and rapid reading of one play of Plautus.

3 hrs., either half-year. First half-year, one section. M W F, 2. Second half-year, seven sections. M W F, 8, 9, 10, 3; Tu Th S, 8, 9. Prerequisite: Course 1. Prescribed in the College of Letters; may be counted for prescribed or free elective work in the Colleges of Social and Natural Sciences, and as a free elective in other colleges, subject to their regulations.

3. **Latin Composition, I.** Dr. PRICE and Mr. KEEP.

Exercises in writing Latin prose narrative.

1 hr., throughout the year. Four sections. Th, 11, 1, 2, 3. Prerequisite: The requirements in Composition of Subject 7*b* of the revised admission requirements, or Course B.

4. **Latin Composition, II.** Dr. PRESCOTT and Mr. DEUTSCH.

Writing Latin in periodic style. Retranslation of English versions of Latin and Greek authors and of selections from English classic writers.

1 hr., throughout the year. Three sections. Tu, 1, 2, 3. Prerequisite: Satisfactory completion of Course 3. Prerequisite for the Group Elective in Latin.

5. **Horace and Virgil.**

Professor KELLOGG, Assistant Professor RICHARDSON, Dr. SIMONDS, Dr. PRESCOTT, and Dr. BASORE.

The Odes and Epodes of Horace. Private reading of selections from Virgil's Æneid, vii–xii.

3 hrs., first half-year. Five sections. M W F, 8, 10. Tu Th S, 9, 10. Prerequisite: Course 2, completed, or in progress.

6. **Terence; Sallust.** Professor KELLOGG.

Two plays of Terence; Sallust, Catiline, for private reading.

2 hrs., second half-year. M W, 10. Prerequisite: Course 5.

8. **Cicero, Letters; Roman Literature.**

Assistant Professor RICHARDSON.

Select letters of Cicero. Mackail's Roman Literature.

2 hrs., second half-year. Tu Th, 10. Prerequisite: Course 5.

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9. **Catullus; Ovid.** Dr. BASORE.

Selections from Catullus; Ovid's Heroides for private reading.

2 hrs., second half-year. Tu Th, 10. Prerequisite: Course 5.

10. **Horace, Satires and Epistles.** Dr. SIMONDS.

A course in rapid reading.

2 hrs., second half-year. Tu Th, 9. Prerequisite: Course 5.

ADVANCED COURSES FOR UNDERGRADUATES.

Prerequisite: One course selected from Courses 6 to 11.

12. **Latin Composition, III.** (G.E.) Assistant Professor RICHARDSON.

Extended idiom; translation of English masterpieces. Training in Latin expression and construction.

1 hr., throughout the year. Th, 3. Additional prerequisite: Satisfactory completion of Course 4.

13. **Latin Composition, IV.** (G.E.) Dr. SIMONDS.

Translation into Latin prose from models of exposition and argument. Original Latin essays.

1 hr., throughout the year. Th, 3. Additional prerequisite: Satisfactory completion of Course 12.

15. **Roman Elegiac Poetry.** (G.E.) Professor MERRILL.

Selections from Tibullus and Propertius, and private reading from Catullus and Ovid.

3 hrs., first half-year. M W F, 10.

16. **Ovid; Propertius.** (G.E.) Assistant Professor RICHARDSON.

Ovid, Fasti; Propertius, Book v; Roman religion and folk-lore, with modern parallels.

3 hrs., first half-year. Tu Th S, 9.

17. **Virgil's Georgics.** (G.E.) Assistant Professor RICHARDSON.

Metrical reading, translation, and exegesis. Survey of Roman Husbandry, with selections from Cato and Columella.

2 hrs., second half-year. Tu Th, 8.

18. **Tacitus, Histories; Suetonius.** (G.E.) Professor KELLOGG.

Selections from the Histories of Tacitus, and the Galba, Otho, and Vitellius of Suetonius.

2 hrs., first half-year. Tu, Th, 10.

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20. **Martial and Juvenal.** (G.E.) Professor MERRILL.

Society under the Caesars. Two satires of Juvenal will be read privately in addition to such as shall be discussed publicly.

3 hrs., first half-year. M W, 11; F, 4.

21. **Juristic Latin.** (G.E.) Professor MERRILL.

The Latinity of Gaius and Justinian as it appears in the Institutes.

3 hrs., second half-year. M W F, 10. Students electing this course are advised to take also Course 5 (Roman Law) in the Department of Jurisprudence. The main object of the course is to secure facility in reading Law Latin.

23. **Tacitus, Suetonius.** (G.E.) Professor MERRILL.

Tacitus, Annals; Suetonius, Tiberius. The character of Tiberius.

3 hrs., second half-year. M W, 11; F, 4.

25B. **Lucretius.** (G.E.) Dr. SIMONDS.

Criticism and interpretation of the poem and outline of the Epicurean system.

3 hrs., first half-year. M W F, 3.

26. **Quintilian, Books x and xii.** (G.E.) Professor KELLOGG.

Literary criticism among the Romans.

2 hrs., second half-year. Tu Th, 10.

29. **Roman Oratory.** (G.E.) Assistant Professor RICHARDSON.

The Orator of Cicero. Independent investigations in the history of Rhetoric, and a survey of the rhetorical writings of Cicero, Quintilian, and Tacitus.

3 hrs., first half-year. M W F, 2.

31. **Roman Satire.** (G.E.) Dr. SIMONDS.

Lectures on the history of Roman Satire, with translation and exegesis of selected satires from Ennius to Juvenal.

2 hrs., second half-year. M W, 4.

32. **Bucolic Poetry.** (G.E.) Dr. SIMONDS.

The Bucolics of Virgil: and the Idylls of Theocritus in English. Selections from Calpurnius, Nemesianus, and Statius.

2 hrs., first half-year. M W, 4.

35. **Teachers' Training Course.** Assistant Professor RICHARDSON.

Problems in teaching Latin; estimates of text-books; visiting of local schools. Examination of questions in pronunciation and syntax; exercises in teaching preparatory authors.

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3 hrs., second half-year. Tu Th S, 9. Additional prerequisite: Senior or Graduate standing.

38. Cicero's Correspondence. (G.E.) Dr. NUTTING.

Critical reading of a selection from the letters of Cicero, with special study of contemporaneous events.

3 hrs., first half-year. M W F, 9.

39. Roman Comedy. (G.E.) Dr. PRESCOTT.

Selected plays of Plautus and Terence with some attention to the place of comedy in Roman literature. Critical study of versification, language, and syntax.

2 hrs., throughout the year. Tu Th, 11.

40A. Latin Grammar; Forms; Syntax of the Noun. (G.E.) Dr. NUTTING.

A study of the forms of the Latin language, based on a text-book; lectures on the syntax of the cases. [Important for prospective teachers.]

2 hrs., first half-year. W F, 8. Additional prerequisite: Course 4.

40B. Latin Grammar; Syntax of the Verb. (G.E.) Dr. NUTTING.

A survey of some of the important problems of Latin syntax. Preparation of assigned work, and lectures.

2 hrs., second half-year. W F, 8. Additional prerequisite: Course 4.

41. Palaeography and Text Criticism. (G.E.) Dr. PRICE.

Lectures on palaeography and practice in reading fac-similes and original manuscripts. Special attention to the decline of the square capital. Practical exercises conducted by students. [Recommended as a preparation for Course 34.]

2 hrs., second half-year. M W, 1.

53. Roman Private Life. (G.E.) Assistant Professor RICHARDSON.

A lecture course illustrated from the survivals of ancient plastic art. Collateral reading with reports.

2 hrs., second half-year. M W, 2.

54. Roman Topography. (G.E.) Dr. SIMONDS.

Topography and monuments of Ancient Rome. Lectures with collateral reading and reports.

2 hrs., second half-year. M W, 3.

58. Cicero, Pro Cluentio. (G.E.) Professor KELLOGG.

Introduction to Roman legal procedure.

2 hrs., second half-year. Tu Th, 11.

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59. **Advanced Syntax.** (G.E.) Dr. NUTTING.

The subject for investigation will be the Conditional Sentence. The work of the first half-year will be the collection of material, with occasional meetings for conference; the second half will be devoted to class exercises. A reading knowledge of German is essential.

2 hrs., throughout the year. 1 unit first half; 2 units second half. M W, 9.

60. **Roman Epigraphy.** (G.E.) Dr. PRICE.

Lectures on Epigraphy, and exercises in interpretation of Inscriptions in the Corpus and from squeezes and fac-similes. Students must have a working knowledge of French and German, and be provided with Egbert's Manual.

2 hrs., first half-year. M W, 1.

COURSES FOR GRADUATES.

25A. **Cicero, De Natura Deorum.** Professor KELLOGG.

Criticism and interpretation.

3 hrs., second half-year. M W F, 9.

30. **Latin Verse Composition.** Assistant Professor RICHARDSON.

Latin hexameters, elegiacs, sapphics, asclepiads, and alcaics.

1 hr., throughout the year. Tu, 3.

34. **Latin Seminary.** Professor MERRILL.

Criticism and interpretation of Lucretius. Exercises in diplomatic criticism; treatment of grammatical, philosophical, and literary subjects suggested by the Latin text. The entire poem will be read privately.

3 hrs., throughout the year. Th, 4; S, 10–12. Required of all candidates for higher degrees who make Latin their major subject.

47. **Metric.** Assistant Professor RICHARDSON.

Studies in Greek and Latin verse forms. Lectures.

1 hr., throughout the year. Th, 2.

51. **Cicero: Tusculan Disputations.** Professor KELLOGG.

Criticism and interpretation.

3 hrs., first half-year. M W F, 9.

Elementary Sanskrit. [See Linguistics 4.] Dr. SIMONDS.

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ENGLISH.

CHARLES M. GAYLEY, Litt.D., LL.D., Professor of the English Language and Literature.

CORNELIUS B. BRADLEY, M.A., Professor of Rhetoric.

ALEXIS F. LANGE, Ph.D., Associate Professor of English and Scandinavian Philology.

LOUIS DU PONT SYLE, M.A., Associate Professor of English Literature.

WILLIAM D. ARMES, M.L., Assistant Professor of English Literature.

THOMAS F. SANFORD, A.B., Assistant Professor of English Literature.

CHAUNCEY W. WELLS, A.B., Assistant Professor of English Composition.

JAMES A. WINANS, M.A., Assistant Professor of Public Speaking.

MARTIN C. FLAHERTY, Ph.B., Instructor in Argumentation.

GEORGE R. NOYES, Ph.D., Instructor in English and Russian.

BENJAMIN P. KURTZ, A.B., Reader in English.

THOMAS J. PENFIELD, A.B., Reader in English.

STUART G. MASTERS, A.B., Reader in English.

J. RAYMOND CARTER, A.B., Reader in English.

Two other Readers in English.

Regular students who undertake the work of this department must have credit for entrance English A, and 1 or 14, and special students must have credit for all three requirements. Of the University courses, 1, 2A, and 2B must, ordinarily, precede all advanced courses. Course 1 fulfils the prescription for the College of Letters. Courses 1, 2A, and 2B or 2C, or Courses 1, 2A, and 3 or 4 or 5 fulfil the prescription for the Colleges of Social Sciences and Natural Sciences. Course A (formerly 3A) and four units taken from Courses 3, 4, 6, 7, and 8 fulfil the prescription for the Colleges of Commerce, Agriculture, and Chemistry; but, with the consent of the dean of the college, Course 1 or 2 may be substituted. Courses A, 3, 4, and 6 are especially adapted to the needs of students in the Colleges of Applied Science.

The Group Elective. Prerequisite to the Group Elective are: *(a)* The completion of Courses 1, 2A, 2B or 2C, and 5 (but students in the College of Letters who present twelve units of University credit in Latin and twelve in Greek may omit Course 2B); and *(b)* the completion of University courses to the amount of twelve units in each of

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two foreign languages—one of which must be the Latin or the Greek. Students whose Group Elective lies entirely in English must include in their lists at least one Group Elective course under the heading Composition and Speaking, and two under the heading Philology and Literary Criticism (one from Courses 11A to 14C, and another from Courses 9A to 23). All courses, unless otherwise specified, are open as Free Electives, subject only to the proper sequence of studies.

For Teachers' Certificates the requirements are as in the preceding paragraph; except that candidates must also present University credit for twelve units in Philosophy or History; and that they must complete Courses 3, 13, and two courses from 12 and 14. Students, however, who are making the Group Elective in Economics and Politics may substitute 7A, 7B, and 7C, for 5, 12, and 14. Courses 6, 9, 10, 13, 14, 17, 18, 21, 23, and the graduate courses are especially adapted to the needs of students who desire to teach.

PRELIMINARY COURSES.

A (formerly 3A). Elementary Composition.

Assistant Professor WELLS and three Readers.

Designed for those whose preparation for more advanced writing is insufficient. Careful study of paragraph and sentence, followed by the study of such prose masterpieces as meet the needs of the class; fortnightly compositions with regular appointments for criticism.

1 hr., throughout the year. W or Th, 3. Required (but without credit) of students who have not credit for entrance Subject A. Prescribed in the Colleges of Commerce, Agriculture, and Chemistry, unless the dean of the college desires otherwise. Open to all Freshmen as Free Elective.

1. General History of English Literature.

Associate Professor SYLE, Assistant Professors ARMES and SANFORD.

The development of our literature from the Beowulf to the time of Wordsworth; the study of representative specimens, with lectures explanatory of their historical connection. Exercises in oral composition. Each student will also be required to write two essays each term under the individual supervision of his instructor, and to keep appointments for criticism.

3 hrs., throughout the year. Eleven sections. M W F, 9, 10, 11, 1, 2; Tu Th S, 9, 10, 11. This course must precede all others, except Course A.

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1A. General History of English Literature.

Associate Professor SYLE.

The same as Course 1.

3 hrs., throughout the year, beginning second half-year. One section.

2. General Composition.

Courses 2A, 2B, and 2C consist of frequent essays (under individual supervision) for the purpose of developing constructive ability and technical skill; oral composition. This course includes the direct study of elements and qualities of prose style as found in selected works of modern authors. Regular appointments for criticism.

2A. Exposition.

Assistant Professor WELLS, Mr. FLAHERTY, and three Readers.

3 hrs., first half-year. Six sections. M W F, 10, 1, 2; Tu Th S, 9, 10, 11.

2B. Narration and Description.

Assistant Professor WELLS, Mr. FLAHERTY, and three Readers.

3 hrs., second half-year. Five sections. M W F, 10, 1, 2; Tu Th S, 10, 11.

2C. Argumentative Writing. Mr. FLAHERTY and a Reader.

Principles, methods and practice, based upon a study of representative masterpieces.

3 hrs., second half-year. One section. Tu Th S, 9. Optional with 2B, but limited to students approved by the instructor. A second section may be formed at 10 or 11, if necessary.

3. Elocution. Assistant Professor WINANS.

Introductory course: principles and methods; exercises in enunciation and expression. Analysis and delivery of extracts from prose and verse, and of short original speeches. Individual instruction by appointment.

3 hrs., throughout the year. Three sections, each limited to twenty-four members. Tu Th S, 8, 9, 10. Open only to regular students of the University, not to students of special or limited status. Prerequisite: Course 1, except for students in the Colleges of Commerce and Applied Science who may present Course A instead. Required of prospective teachers unless they pass the examination set by the instructor. Must precede Courses 7 and 8.

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4. **Great Books.** Professor GAYLEY and a Reader.

A discussion of certain foreign masterpieces in their bearing upon English literature. Lectures, reading, and reports. Since the discussion extends through two half-years, the course may be taken twice.

1 hr., second half-year. F, 4. Intended especially for students in the Colleges of Applied Science and Commerce. Open to other students only after they have passed Course 1. It may then be taken as Free Elective, or as optional with 2B toward the completion of the hours prescribed.

5. **Old English.** Associate Professor LANGE and Dr. NOYES.

Grammar; reading of selected prose and poetry.

3 hrs., first half-year. Three sections. Section I, M W F, 9. Sections II and III, M W F, 9, 10. Prerequisite: Sophomore standing; for Section I, also the consent of Associate Professor LANGE.

ADVANCED COURSES.

A.—PRIMARILY FOR JUNIORS AND SENIORS.

COMPOSITION, AND SPEAKING.

6. **Composition Under Individual Training and Direction.** (G.E.)

6A. Exercises based upon the Scientific Prose of the nineteenth century; selections from some of the following: Darwin, Wallace, Tyndall, Huxley, Mill, Spencer.

Associate Professor SYLE.

3 hrs., first half-year. M W F, 2. Open only to students who have shown distinct ability in Course 2, and have the permission of the instructor.

6B. **Rapid Writing.** (G.E.) Assistant Professor WELLS.

For ten weeks, daily themes: The preparation of one single-page composition every day (except Saturday); discussion in class of points of form and style. The remainder of the half-year's work will vary according to individual needs; either *(a)* continuation of daily themes or *(b)* weekly themes of about six hundred words each.

2 hrs., first half-year. Tu Th, 1.

6C. **Advanced Composition: Narrative and Descriptive.** (G.E.)

Assistant Professor WELLS.

Short sketches and stories; verse forms. The lectures will be studies in narrative, based on representative novels and stories.

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Fortnightly compositions, with regular appointments for criticism.

2 hrs., second half-year. Tu Th, 1. Limited to students who have the permission of the instructor.

7. Debating.

7A. Argumentation. (G.E.) Mr. FLAHERTY.

Preparation of briefs; presentation of arguments. Criticism of delivery by the assistant professor in public speaking.

3 hrs., first half-year. Th, debate, 3; supervision of briefs, —. Prerequisite: Courses 1, 2A, 2B or C (or its equivalent) and 3 in English, and the prerequisite to the Group in Economics and Politics.

7B. Forensics. (G.E.) Mr. FLAHERTY.

Practice in debating. Arguments concerning moot-questions in politics and economics. Criticism of delivery by the assistant professor in public speaking.

3 hrs., second half-year. Th, 3–5; supervision of briefs, —. Open only to students selected from the class in Argumentation.

7C. Oral Debates Upon Literary Topics. (G.E.) Professor GAYLEY.

Training in the literary and stylistic features of argumentative discourse; the discussion of moot-questions concerning Shakespeare's plays and other masterpieces. Criticism of delivery by the assistant professor in public speaking.

2 hrs., first half-year. F, 4–6. Open to men who have taken 7A and 7B.

*7D. Masterpieces of Argumentation. (G.E.) Mr. FLAHERTY.

2 hrs., throughout the year.

8. Training in Speaking and Delivery.

8A. The Delivery of Speeches. Assistant Professor WINANS.

Especial attention as in Course 3 to Elocution. Speeches, written and extempore; structure and methods of preparation; nature and kinds of oratory; study of representative orations.

2 hrs., throughout the year, at the option of the instructor; W F, 9. Limited to twelve specially qualified Juniors and Seniors, who after 1902–03 will be chosen from Course 3. This and the other courses under 8 are not open to special or limited students.

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*8B. The History of Oratory. Assistant Professor WINANS.

Especial attention to British and American oratory. American orations will be considered in connection with history. Readings with discussions of style.

2 hrs., second half-year. Prerequisite: Courses 1, 2A, 2B or 2C, and 3.

8C. Teachers' Course. Assistant Professor WINANS.

Attendance at the meetings of certain other courses; practice under direction. Discussion of methods.

3 hrs., throughout the year, at the option of the instructor. Limited to eight members.

*10A. Interpretation: Logical and Literary. (G.E.)
Associate Professor LANGE.

Principles and methods; study of representative masterpieces; practical exercises, oral and written, with a view to training in composition. This course alternates with 10B. It will be given in 1903–04.

2 hrs., second half-year. M W F, 10. Prerequisite: At least Junior standing.

10B. Translation. (G.E.) Associate Professor LANGE.

Discussion of the factors and processes of interpretation involved; comparative study of representative specimens; practical exercises with a view to training in composition.

3 hrs., second half-year. M W F, 10. Prerequisite: At least Junior standing.

PHILOLOGY AND LITERARY CRITICISM.

Owing to the rapidly increasing demands made by the classes of the first and second years upon the officers of the department, Courses 15, 16, 19, 22, 24, and 25, covering sixteenth century poetry (exclusive of the drama) and prose, seventeenth century poetry and prose (exclusive of Milton), eighteenth century poetry and prose, the history of American literature and the study of special American authors, the development of literary types (drama and novel) and the history of the romantic movement, are, for the present, withdrawn. The same or equivalent courses may, however, be expected, as soon as circumstances permit.

* Not to be given in 1902–03.

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*11A. Germanic Sources of English Life and Culture. (G.E.)
Associate Professor LANGE.

Topical study and lectures.

3 hrs., first half-year. M W F, 9.

11B. Norse Mythology. Associate Professor LANGE.

Lectures and topical study.

2 hrs., second half-year. M W, 11. Prerequisite: At least Junior standing.

12A. Beowulf. (G.E.) Associate Professor LANGE and Dr. NOYES.

A critical study of the poem; investigation of special topics pertaining to the Germanic element in English life and culture.

3 hrs., second half-year. Two sections. M W F, 9.

*12B. Old English Laws. (G.E.) Associate Professor LANGE.

Sources, characteristic features, and cultural aspects. Translation and collateral reading.

2 hrs., second half-year.

13. Chaucer. (G.E.) Associate Professor LANGE and Dr. NOYES.

A minute study of selected tales and poems; the life and thought of his times.

3 hrs. Section I (Lange), first half-year; Section II (Noyes), second half-year. M W F, 9, 10.

14A. Modern English Phonology. (G.E.)
Associate Professor LANGE.

A historical study of English pronunciation since 1500, with introductory lectures on the elements of phonetics.

3 hrs., first half-year. M W F, 8. Prerequisite: Course 5.

*14B. History of the English Language. (G.E.)
Associate Professor LANGE.

The origin and growth of the English tongue, with special reference to phonology and accidence. This course alternates with 14A. It will be given in 1903–04.

14C. Introduction to English Grammar. (G.E.)
Professor BRADLEY.

Lectures, with collateral study.

3 hrs., first half-year. M W F, 8. Prerequisite: Course 5.

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*Not to be given in 1902–03.

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9A. **The Theory of Poetry.** (G.E.)
Professor GAYLEY and a Reader.

Lectures on poetry in its relation to the other arts; versification. Reports on Aristotle's Poetics, Lessing's Laocoön, Freytag's Technique of the Drama, etc. Fortnightly exercises in criticism and construction.

3 hrs., second half-year, 1902–03. M W F, 2. Prerequisite: Courses 1 and 2, and Junior standing.

*9B. **Problems in Literary Criticism.** (G.E.) Professor GAYLEY.

The characteristics and development of literary types (in 1899-1900, Lyric, Ballad, and Idyl; in 1901–02, Epic, Romance, and Novel). Seminar.

2 hrs., alternating with 9C. W, 3-5.

*9C. **The History of English Critical Prose.** Professor GAYLEY.

Periods of development; special study of influences in theory and method, and of the pivotal masterpieces.

2 hrs., first half-year 1903–04. Open to students who show especial ability in Course 9A; also to Graduates.

17A. **The Predecessors and Contemporaries of Shakespeare.** (G.E.)
Professor GAYLEY and a Reader.

Lectures: historical and critical; a system of study; reading of representative plays; frequent written exercises by the class under individual supervision.

3 hrs., first half-year. M W F, 2. Prerequisite: Courses 1 and 2, and at least Junior standing.

17B. **Shakespeare.** (G.E.) Professor GAYLEY.

His personality and the development of his method. Historical and textual criticism of selected works. Seminar.

2 hrs., second half-year, 1902–03. W, 3–5. Open to students who have shown especial ability in Course 17A; also to Graduates.

18A. **Milton.** (G.E.) Professor BRADLEY.

His Life and Times. Lectures, with reading of his Englieh poems and selections from his prose.

2 hrs., first half-year. Tu Th, 8. Prerequisite: At least Junior standing.

18B. **Milton.** (G.E.) Professor BRADLEY.

Study of special problems in connection with his poems.

3 hrs., second half-year. M W F, 8. Prerequisite: Course 18A.

* Not to be given in 1902–03.

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*21A. History of Poetry in the Nineteenth Century. (G.E.)
Professor GAYLEY, assisted by a Reader.

Lectures; reading and reports.

3 hrs., second half-year 1901–02; first half-year 1903–04. M W F, 2. Fortnightly written exercises under individual criticism. Prerequisite: Courses 1 and 2 and at least Junior standing.

21B. Poems of the Nineteenth Century. (G.E.) Professor GAYLEY.

Intensive study of selected masterpieces of Wordsworth, Tennyson, Arnold, Browning, and other poets. Seminar.

2 hrs., first half-year 1902–03. W, 3–5. Open to those students who have shown especial ability in Course 21A; also to Graduates.

23. Representative Essayists—Arnold or Emerson. Seminar. (G.E.)
Professor BRADLEY.

3 hrs., second half-year. M W F, 10. Open to Seniors who have the instructor's permission, and to Graduates. Application should be made to the instructor before December 15.

*26. Political and Philosophical Prose. (G.E.)
Professor GAYLEY.

Advanced study of pivotal classics with reference to the thought, the arrangement, exposition, and style. This course will be given in 1903–04. It alternates with 21B.

2 hrs., first half-year. W, 3–5.

B.—FOR GRADUATES.

*30. Old Norse. Associate Professor LANGE.

Outline of the grammar; readings. The relations of Old Icelandic to Gothic and Old English.

3 hrs., first half-year. M W, 11; F, 1. Prerequisite: Course 5, and, if possible, a knowledge of Gothic. This course may, in exceptional cases, be taken by Seniors.

31. Philological Seminar. Associate Professor LANGE.

(*a*) Linguistic studies in First Modern English.

2 hrs., second half-year.

(*b*) Philological interpretation and criticism—Old Fortunatus, by Thomas Dekker.

2 hrs., first half-year. Hours to be arranged with the instructor.

* Not to be given in 1902–03.

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***32. The Influence of Germany on English Literature of the Eighteenth and Nineteenth Centuries.** Associate Professor LANGE.

(*a*) Goethe and Carlyle.

2 hrs., throughout the year.

35. Seminar in English Grammar. Professor BRADLEY.

Investigation of special problems of grammatical system.

3 hrs., second half-year. W F, 1–3. In exceptional cases this course may be taken by Seniors; but it must be preceded by 14C or its equivalent.

36. Rhetorical Seminar. Professor BRADLEY.

An inductive study of specimens of selected types of prose literature in order to determine characteristics of style and record the order of their development.

3 hrs., first half-year. W F, 1–3. In exceptional cases this course may be taken by Seniors.

***40. The History of Æsthetic.** Professor GAYLEY.

From a study at first hand of the principal authorities.

3 hrs., throughout the year. This course should be preceded by Course 9A or 9B.

41. Seminar in English Literary History. Professor GAYLEY.

In 1901–02 and 1902–03, the careful investigation of problems in the development of English Comedy.

4 hrs., first half-year. M, 3–5; F, 3. This course should be preceded by Courses 17A and 17B.

42. Seminar in Comparative Literature. Professor GAYLEY.

History and methods of the study: the application of principles in the investigation of an author, a theme, a movement or a type. This course like the preceding runs through two or more years.

4 hrs., second half-year. M, 3–5; F, 3. Prerequisite: Courses 9 and 40 (if possible), and a sufficient knowledge of the classics and the modern languages.

50. Special Study.

The instructors in English hold themselves ready to assist and advise competent students who may propose plans of special study which meet the approval of the department.

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* Not to be given in 1902–03.

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GERMAN.

HUGO KARL SCHILLING, Ph.D., Professor of the German Language and Literature.

ALBIN PUTZKER, M.A., Professor of German Literature.

*J. HENRY SENGER, Ph.D., Associate Professor of German

CHARLES R. KEYES, M.A., Instructor in German.

MARTIN A. M. CENTNER, A.B., Instructor in German.

LUDWIG J. DEMETER, M.A., Instructor in German.

CLARENCE PASCHALL, M.A., Instructor in German.

MICHAEL ONGERTH, Grad. Theol. (Univ. of Vienna), Reader.

The Group Elective. Prerequisites are Courses 1 (or admission subject 15*b*) and 2, or Course 1A. Course 3A or Course 3B will be accepted in lieu of Course 2 upon the conditions stated under Course 3B.

Students who wish to make a special study of German Literature are advised to acquire a reading knowledge of French. In the graduate courses some knowledge of Greek is highly desirable.

Teachers' Certificates. Students who desire the Teachers' Certificate should do not less than eighteen units of Group Elective work in German, including Courses 6A, 6B, 7A, and 18. The recommendation for the certificate is not, however, given in course, but only for high scholarship and general proficiency in German, as judged by the department.

INTRODUCTORY COURSES.

PRIMARILY FOR FRESHMEN.

1. Elementary German.
Mr. KEYES, Mr. CENTNER, and Mr. PASCHALL.

The essentials of grammar; reading of modern prose; translation into German; reading at sight; conversation.

3 hrs., throughout the year. M W F, 8, 9, 10, 1; Tu Th S, 8, 9, 10.

1A. Elementary German (Double Course). Mr. DEMETER.

Grammar, including syntax; reading of modern prose and poetry and of one of Schiller's dramas; composition; reading at sight; conversation.

* Absent on leave 1902–03.

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5 hrs., throughout the year. M Tu W Th F, 2.

This course combines the work of Courses 1 and 2 and is intended for beginners who wish to prepare, in one year, for the advanced courses in German, or to acquire a reading knowledge of the language sufficient for use in other studies.

INTERMEDIATE COURSES.

PRIMARILY FOR SOPHOMORES.

Prerequisite: Course 1 or credit in admission subject 15*b*.

2. Modern Stories and Plays.
Professor PUTZKER, Mr. KEYES, Mr. DEMETER, and Mr. PASCHALL.

Selections from prose and poetry, including one of Schiller's dramas; grammar and composition; reading at sight; conversation.

3 hrs., throughout the year. M W F, 8, 9; Tu Th S, 8, 9, 10.

3A. German Prose. Professor PUTZKER.

Subjects in History and Economics. Journalistic German. Constant practice in reading at sight.

3 hrs., throughout the year. M W F, 10.

3B. Scientific German. Mr. DEMETER.

Subjects in the Natural Sciences. Exercises in composition. Constant practice in reading at sight.

3 hrs., throughout the year. M W F, 10.

Course 2 is the regular Sophomore course leading up to the advanced courses in German. Courses 3A and 3B provide special training in the reading of more or less technical texts, and are, therefore, not equal to Course 2 as a preparation for the literary courses; this applies especially to Course 3B. Students who have had Course 3A or Course 3B may, however, take Course 6A; and they may be admitted to Course 4, 5, or 8, if they take at the same time Course 6A or satisfy the department that they are not deficient in grammar and composition.

For students who have taken or are taking one of the three intermediate courses, either of the other two will count as four units only.

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ADVANCED COURSES FOR UNDERGRADUATES.

A. Primarily for Juniors.

Prerequisite: Course 1A or 2, or credit in admission subject 15b^s (Intermediate German); or, conditionally, Course 3A or 3B.
The courses in this group will be conducted largely in German.

4. **Classics of the Eighteenth Century: Schiller.** (G.E.)
Mr. Centner.

Schiller's principal dramas, and selections from his prose writings; Lessing's Minna von Barnhelm or Emilia Galotti; Goethe's Egmont or Iphigenie or Hermann und Dorothea. Lectures on the life and times of Schiller, with collateral reading. Practice in composition.

3 hrs., throughout the year. M W F, 4.

5. **Classics of the Eighteenth Century: Lessing.** (G.E.)
Professor Putzker.

Lessing's principal dramas; Schiller's Wallenstein's Lager and Wallenstein's Tod; Goethe's Egmont or Iphigenie or Hermann und Dorothea. Lectures on the life and times of Lessing, with collateral reading. Practice in composition.

3 hrs., throughout the year. M W F, 1.

8. **Classics of the Eighteenth Century: Goethe.** (G.E.)
Professor Schilling.

Goethe's principal dramas, and Hermann und Dorothea; Schiller's Wallenstein's Lager and Wallenstein's Tod; Lessing's Minna von Barnhelm or Emilia Galotti. Lectures on the life and times of Goethe, with collateral reading. Practice in composition.

3 hrs., throughout the year. M W F, 8.

6A. **Grammar, Composition, and Conversation.** First Course. (G.E.)
Mr. Demeter.

2 hrs., throughout the year. Tu Th, 11.

B. Primarily for Seniors.

Prerequisite: Course 4, 5, or 8; for Course 6B: Course 6A.
The courses in this group (except Course 21) will be conducted mainly in German.

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18. General History of German Literature. (G.E.)
Professor SCHILLING.

Lectures (in German) and discussions; collateral reading; essays.

A. German Literature in the Middle Ages.

3 hrs., first half-year. M W F, 2.

B. German Literature from the Reformation to the Death of Goethe.

3 hrs., second half-year. M W F, 2.

7A. Middle High German. (G.E.) Mr. KEYES.

Outlines of grammar, with special reference to the development of Modern German. Selections from the Nibelungenlied, the Kudrun, and the epics of chivalry. Translation into Modern German.

3 hrs., first half-year. M W F, 9.

7B. Classic Writers of the Middle Ages. (G.E.)
Professor SCHILLING.

The poems of Walther von der Vogelweide; Hartmann's Iwein or Gottfried's Tristan.

3 hrs., second half-year. M W F, 9.

*10. German Lyrics of the Nineteenth Century. (G.E.)
Professor PUTZKER.

Lenau, Kleist, Körner, and other poets. Lectures and essays.

2 hrs., throughout the year.

6B. Grammar, Composition, and Conversation. Second Course. (G.E.) Mr. CENTNER.

1 hr., throughout the year.

21. The Teaching of German.

A course in methods, text-books, and teachers' aids, with practical demonstrations and visiting of schools. Collateral reading and reports.

1 hr., second half-year.

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*Omitted in 1902–03; to be given in 1903–04.

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COURSES FOR SENIORS AND GRADUATES.

Prerequisite: Course 18, 7A, 7B, or 10.

*15. The Romantic School. (G.E.) Associate Professor SENGER.

Herder's Volkslieder; Tieck; Novalis; the two Schlegels; Brentano; Eichendorff; Rückert, Uhland, Heine. Essays and composition.

3 hrs., throughout the year.

*20. The German Drama of the Present Day. (G.E.) Professor SCHILLING.

3 hrs., second half-year.

22. The Faust Legend and Goethe's Faust. (G.E.) Professor SCHILLING.

3 hrs., first half-year. M W F, 9.

23. Goethe's Lyrics. (G.E.) Professor PUTZKER.

2 hrs., second half-year.

COURSES FOR GRADUATES.

*13. Introduction to Germanic Philology: Phonology, Morphology; Gothic. Professor SCHILLING.

3 hrs., first half-year.

*19. Old Saxon. Outlines of Germanic Metrics. Professor SCHILLING.

3 hrs., second half-year.

17. Old High German. Professor SCHILLING.

3 hrs., first half-year.

12. Historical Grammar of the German Language: Middle High German and Modern German. Professor SCHILLING.

3 hrs., second half-year.

25. Schiller's Philosophical Poems and Æsthetic Essays. Professor PUTZKER.

3 hrs., first half-year.

*26. Germanic Antiquities. Professor SCHILLING.

3 hrs., first half-year.

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* Omitted in 1902–03; to be given in 1903–04.

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ROMANIC LANGUAGES.

FÉLICIEN V. PAGET, Bachelier ès Lettres, Bachelier ès Sciences, Professor of the Romanic Languages and Literatures.

CHARLES H. HOWARD, M.A., Instructor in French.

GUSTAVE FAUCHEUX, Bachelier èt Lettres, Bachelier ès Sciences, Instructor in French.

SAMUEL A. CHAMBERS, M.A., Instructor in French.

——— ———, Instructor in French.

CARLOS BRANSBY, M.A., Instructor in Spanish.

——— ———, Assistant in French.

EMMANUEL B. LAMARE, Assistant in French.

MARIUS J. SPINELLO, A.B., Assistant in Italian and French.

The work of Courses 1 and 2 is continuous. No credit will be given for either of the Elementary Courses to those who already have credit for twelve units. At the discretion of the officers of the department, students who enter the University with some knowledge of French or Spanish may be admitted to advanced courses in the department, and may be allowed an advanced credit; but such credit will not be more than six units, unless it be based upon work systematically performed in some university of good standing.

It is important that each student in French or Spanish be provided with a dictionary which gives phrases and idioms. One of the most satisfactory is that of Roubaud, published as Cassell's, Heath's, Classic, and otherwise.

The Group Elective. Spanish or Italian may be offered separately or in conjunction with any of the Advanced Courses in French as a single subject in the Group Elective. The subject Romanic Languages includes the three.

Teachers' Certificates. Students who desire the recommendation of the department for this certificate for French must include in their lists Courses 5, 5A, and 5B; for Spanish they must include Course 19. For other courses they should consult the instructors in the department.

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ELEMENTARY COURSES IN FRENCH.

1. Introductory Course.

Mr. HOWARD, Mr. CHAMBERS,
Mr. SPINELLO, and Mr. LAMARE.

The essentials of French grammar, reading, translation, and composition. Aldrich and Foster's Foundations of French.

3 hrs., throughout the year. Six sections. M W F, 8, 10, 1, 2; Tu Th S, 8.

2. Second-Year French.

Professor PAGET, Mr. HOWARD and Mr. SPINELLO.

Reading and translation of novels and dramas. Professor PAGET will read with the class Le Gendre de Monsieur Poirier in the first half-year.

3 hrs., throughout the year. Four sections. Section I, M F, 9 (Mr. HOWARD); W, 9 (Professor PAGET); II, M F, 9 (Mr. SPINELLO); W, 9 (Professor PAGET); III, M F, 10 (Mr. HOWARD); W, 10 (Professor PAGET); IV, M F, 10 (Mr. SPINELLO); W, 10 (Professor PAGET).

INTERMEDIATE COURSES IN FRENCH.

FOR UNDERGRADUATES.

Course 3 is designed for those who wish to study French from a literary point of view. Courses 5A and 5B are required of those who intend to become teachers of French.

3. Advanced French. Mr. SPINELLO.

Open only to those who have had at least two years of French or have received first grade in Course 1. Reading and translation of novels, dramas and poetry.

3 hrs., throughout the year. M W F, 2.

5A. French Writing and Speaking—Elementary.

Mr. CHAMBERS, Mr. LAMARE, and Mr. ———.

Courses 5A and 5B are intended for prospective teachers. Attention will be given to the more troublesome parts of the grammar, such as the modal auxiliaries and the subjunctive, and there will be a careful reading of some good texts. Prerequisite: Course 1.

3 hrs., throughout the year. Four sections (Sections I and II, Mr. LAMARE; Sections III and IV, Mr. CHAMBERS). Tu Th S, 8, 9, 10, 11.

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5B. French Writing and Speaking—Advanced. Mr. FAUCHEUX.

3 hrs., throughout the year. Two sections. Tu Th S, 10, 11; M W F, 11. Prerequisite: Course 5A.

ADVANCED COURSES IN FRENCH.

FOR GRADUATES AND ADVANCED UNDERGRADUATES.

A.—HISTORICAL COURSES.

7. General View of French Literature. (G. E.) Mr. CHAMBERS.

The object of the course is to study the chief movements and the great writers of the literature. The work will be based on some small manual, which will be expanded by lectures and illustrated, as far as possible, by texts.

3 hrs., throughout the year. Tu Th S, 1.

8. Essays Written in French about Various Literary Topics. (G.E) Mr. FAUCHEUX.

A completion of the course in French writing.

2 hrs., throughout the year. Tu Th, 2. Prerequisite: Course 5B.

8A. Mediæval Literature—Epic. (G.E.) Professor PAGET.

Lectures in English on the epic literature, beginning with the eleventh century. La Chanson de Roland.

1 hr., first half-year. M, 9.

8B. Mediæval Literature—Dramatic. (G.E.) Professor PAGET.

Lectures on the dramatic and historical literature. Le Mystère de la Passion. The four great chroniclers.

1 hr., second half-year. M, 9.

9A. The Sixteenth Century—Prose. (G.E.) Mr. FAUCHEUX.

A study of Montaigne, Rabelais, and other prose writers of the time. Lectures by the instructor.

1 hr., first half-year. W, 9.

9B. The Sixteenth Century—Poetry. (G.E.) Mr. FAUCHEUX.

Marot, Ronsard, Régnier, D'Aubigné. Lectures by the instructor.

1 hr., second half-year. W, 9.

10A. The Seventeenth Century—Prose. (G.E.) Mr. FAUCHEUX.

Critical reading of authors, and some lectures by the instructor. Philosophes, moralistes, orateurs de la chaire: Descartes, Pascal, La Rochefoucauld, La Fontaine, La Bruyère, Bossuet.

3 hrs., first half-year. M W F, 1.

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10B. The Seventeenth Century—Poetry. (G.E.) Mr. FAUCHEUX.

Critical reading and some lectures. Tragédie et Comédie: Corneille, Racine, Molière.

3 hrs., second half-year. M W F, 1.

12A. The Eighteenth Century. (G.E.) Mr. SPINELLO.

Voltaire, Rousseau. Critical reading and some lectures.

2 hrs., first half-year. Tu Th, 3.

12B. Eighteenth Century Drama. (G.E.) Mr. SPINELLO.

Regnard, Marivaux, Beaumarchais, and other dramatists. Same plan as in 12A.

2 hrs., second half-year. Tu Th, 3.

11A. The Romantic Movement. (G.E.) Mr. CHAMBERS.

A selection of the chief writings of J. J. Rousseau, Chateaubriand, Victor Hugo, George Sand and Dumas père. Critical readings and some lectures.

3 hrs., first half-year. Tu Th S, 1.

11B. The Naturalistic Movement. (G.E.) Mr. CHAMBERS.

A selection of the chief writings of Zola, Maupassant, Daudet, and the Goncourts. Critical readings and some lectures.

3 hrs., second half-year. Tu Th, S, 1.

*11C. Nineteenth Century Drama. (G.E.) Mr. CHAMBERS.

The chief dramas of Dumas fils, Augier, and others. Critical readings and some lectures.

2 hrs., first half-year. Tu Th, 1.

*11D. Recent Writers. (G.E.) Mr. CHAMBERS.

Lectures on recent literary movements, and critical reading of such writers as Bourget, Loti, René Bazin.

2 hrs., second half-year. Tu Th, 1.

B.—VICTOR HUGO.

Each course under this head is a study of the literary, social, or philosophical ideas of the author and a critical reading of the works named.

*13. Victor Hugo's Prose. (G.E.) Professor PAGET.

Les Misérables.

2 hrs., throughout the year. Tu Th, 9.

*Not to be given in 1902–03.

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13A. Victor Hugo's Prose. (G.E.) Professor PAGET.
L'Homme qui Rit.
2 hrs., first half-year. Tu Th, 9.

13B. Victor Hugo's Prose. (G.E.) Professor PAGET.
Three dramas. Le Roi S'Amuse, Lucrèce Borgia, Angélo.
2 hrs., second half-year. Tu Th, 9.

*13C. Victor Hugo's Prose. (G.E.) Professor PAGET.
Quatre-vingt-treize, Ruy Blas.
2 hrs., first half-year.

*13D. Victor Hugo's Prose. (G.E.) Professor PAGET.
Notre Dame de Paris, Choses Vues.
2 hrs., second half-year.

*14. Victor Hugo's Poetry. (G.E.) Professor PAGET.
Les Burgraves. Comments in French by the instructor.
2 hrs., first half-year. Tu Th, 10.

*14A. Victor Hugo's Poetry. (G.E.) Professor PAGET.
Les Voix Intérieures.
2 hrs., second half-year. Tu Th, 10.

14B. Victor Hugo's Poetry. (G.E.) Professor PAGET.
Les Châtiments; La Légende des Siècles.
2 hrs., first half-year. Tu Th, 10.

14C. Victor Hugo's Poetry. (G.E.) Professor PAGET.
La Fin de Satan. Continuation of La Légende des Siècles.
2 hrs., second half-year. Tu Th, 10.

C.—LECTURES IN FRENCH.

15A. The Romantic School—Prose. (G.E.) Professor PAGET.
Rise of the School. Bernardin de St. Pierre, J. J. Rousseau, Madame de Staël, Chateaubriand.
1 hr., first half-year. F, 4.

15B. The Romantic School—Poetry. (G.E.) Professor PAGET.
The influence of the School on lyric and dramatic poetry and on the novel. Lamartine, Victor Hugo, De Musset, De Vigny.
1 hr., second half-year. F, 4.

*Not to be given in 1902–03.

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*16A. The Realistic School—Prose. (G.E.) Professor PAGET.

The rise of the School; its close relation to the Romantic School. Balzac, Flaubert, Daudet.

1 hr., first half-year.

*16B. The Realistic School—Drama. (G.E.) Professor PAGET.

A study of modern dramatic literature. Augier, Dumas fils, and other dramatists.

1 hr., second half-year.

*17A. The Naturalistic School. (G.E.) Professor PAGET.

Zola, Les Goncourts.

1 hr., first half-year.

*17B. The Parnassian School. (G.E.) Professor PAGET.

The poets Gautier, Baudelaire, Leconte de Lisle, Sully-Prudhomme.

1 hr., second half-year.

*17C. Histoire du Drame en France au Dix-neuvième Siècle. (G.E.) Professor PAGET.

1 hr., first half-year. F, 4.

*17D. Histoire du Drame. (G.E.) Professor PAGET.

Continuation of the same subject.

1 hr., second half-year. F, 4.

COURSES IN SPANISH.

18. Introductory Spanish. Mr. BRANSBY and Mr. HOWARD.

Grammar and reading of modern prose. Alarcon's El Capitan Veneno, Valera's El Pajaro Verde, and similar works.

3 hrs., throughout the year. Three sections. M W F, 2, 3 4.

19. Spanish Speaking and Writing. Mr. BRANSBY and Mr. HOWARD.

3 hrs., throughout the year. Two sections. M W F, 2. Tu Th S, 8.

19B. Modern Spanish. Mr. BRANSBY.

A course in reading and translation. Valdes's José, Valera's Pepita Jiménez, Galdos's Doña Perfecta, and some drama.

3 hrs., throughout the year. Tu Th S, 9.

20. Classic Spanish. (G.E.) Mr. BRANSBY.

Cervantes's Don Quixote, Calderon's El Magico Prodigioso.

3 hrs., throughout the year. M W F, 3.

*Not to be given in 1902-03.

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COURSES IN ITALIAN.

21. **Introductory Italian.** Mr. SPINELLO.

The object of the course is to give a reading power in the language. Enough grammar will be given to serve as a basis for this. Modern authors: Barrili, Farina, Castelnuovo, Verga, Capuana. Short stories and comedies.

3 hrs., throughout the year. M W F, 8.

22. **Dante's La Divina Commedia.** (G.E.) Mr. SPINELLO.

Inferno. One hour a week of modern Italian authors.

3 hrs., throughout the year. M W F, 8.

*23. **Dante's La Divina Commedia.** (G.E.) Mr. SPINELLO.

Purgatorio. One hour a week of modern Italian authors.

3 hrs., throughout the year.

*24. **Dante's La Divina Commedia.** (G.E.) Mr. SPINELLO.

Paradiso. One hour a week of modern Italian authors.

3 hrs., throughout the year. M W F, 3.

COURSES FOR GRADUATES.

[Latin 28, low Latin, will be found a useful adjunct to any of these courses.]

25. **Old French.** Mr. FAUCHEUX.

Philological study of old texts. Grammaire de l'ancien Français. Traité de la formation de la langue française (Dict. gén.).

First half-year—Chanson de Roland. Second half-year—Chrestien de Troyes, Erec, Yvain—Edition Foerster.

1 hr., throughout the year. S, 9.

26. **Romanic Philology.** Mr. FAUCHEUX.

Phonology, morphology, and comparative syntax of the various Romanic languages. In 1902-03, a special study of the Romanic declension and conjugation.

1 hr., throughout the year; 2 units each half-year. S, 8.

28. **Seminary.** Professor PAGET.

(*a*) Provençal in Appel's Chrestomathie, and Le Roman de Flamenca, 2nd edit., by Paul Meyer; (*b*) Old Spanish: La leyenda de los Infantes de Lara, by Ramon Menendez Pidal.

4 units, either half-year, as a maximum. S, 10.

29. **Special Study.** Professor PAGET.

The instructors in Romanic Languages hold themselves ready to assist and advise students who may propose plans of special study.

*Not to be given in 1902-03.

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SLAVIC LANGUAGES.

GEORGE R. NOYES, Ph.D., Instructor in English and Russian.

RUSSIAN.

1. **Elementary Russian.** Dr. NOYES.

   Motti's Russian Grammar. Tolstoi's Snowstorm.

   3 hrs., throughout the year. M W F, 2.

2. **Second Year Russian.** Dr. NOYES.

   Reading of Russian prose authors: Tolstoi, Turgenev, Lermontov. Composition.

   3 hrs., throughout the year. M W F, 3.

4. **Russian Poetry.** Dr. NOYES.

   Pushkin, Lermontov, Nekrasov, Griboedov. Composition.

   1 hr., throughout the year.

BOHEMIAN.

2. **Bohemian Literature.** Dr. NOYES.

   An outline of Bohemian literature, with reading of important texts.

   1 hr., throughout the year. Prerequisite: A reading knowledge of Bohemian.

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MATHEMATICS.

IRVING STRINGHAM, Ph.D., Professor of Mathematics.

GEORGE C. EDWARDS, Ph.B., Associate Professor of Mathematics.

*MELLEN W. HASKELL, Ph.D., Associate Professor of Mathematics.

CHARLES A. NOBLE, Ph.D., Instructor in Mathematics.

ERNEST J. WILCZYNSKI, Ph.D., Instructor in Mathematics.

ALBERT W. WHITNEY, A.B., Instructor in Mathematics.

DERRICK N. LEHMER, Ph.D., Instructor in Mathematics.

EDWIN M. BLAKE, Ph.D., Instructor in Mathematics.

THOMAS M. PUTNAM, Ph.D., Instructor in Mathematics.

JOHN H. MCDONALD, Ph.D., Instructor in Mathematics.

Students in the College of Letters, or of Social Sciences, must include the subject of Analytic Geometry as an essential part of their programme of mathematical studies. They may satisfy this prescription by electing Course 1 in their Freshman year; but those who prefer a more extended course will do well to elect Courses 2, 4, and 5. Course 6 is strongly recommended to all students who have not already studied Solid Geometry.

Students in the College of Commerce may elect Courses 1 and 6, or Courses 2, 4, and 5.

Students in the Colleges of Natural Sciences and of Agriculture, may elect either Courses 2, 4, 5, and 6, or Courses 1, 2, and 6; or Course 3A, if they enter with credit in Solid Geometry and Plane Trigonometry.

Course 3A is prescribed to Freshmen in the Colleges of Engineering and of Chemistry, and Course 3B to Sophomores in the Colleges of Engineering; Course 10 to Sophomores in the College of Civil Engineering; Course 19A to Juniors in the College of Mechanics. These courses are also open to students in any of the other colleges who have the necessary preparation.

Students wishing to make a specialty of mathematics should consult the members of the department as early as possible. The following

* On leave from July 1, 1902, to June 30, 1903.

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programme may serve as a proper sequence: Freshman year: Courses 2, 4, 5, 6; Sophomore year: Courses 9, 12, 13; Junior year: Courses 11, 14, 17; Senior year: Courses 15, 18, 19, 20.

Students wishing to take mathematics with reference to its applications to Astronomy and Physics, should elect Courses 9, 14, 19, and, if possible, 23 and 24.

The Group Elective. A thorough knowledge of algebra, plane trigonometry, plane analytic geometry, and the differential and integral calculus is prerequisite to Group Elective work.

Teachers' Certificates. The department will, in general, recommend as qualified to teach mathematics in high schools, only such graduates as have passed with credit in Courses 2, 4, 5, 6, 9, 11, 12, 13, 17, 18. It is also of great importance that the prospective teacher of mathematics should be well informed on the relation of mathematics to other sciences, and he should to that end devote a considerable portion of his time to at least one of the closely related sciences. The department further reserves the right to exact a practical test of the candidate's ability to present a clear and interesting exposition of subjects taught in the high school.

INTRODUCTORY COURSES.

For Freshmen and Sophomores Only.

1. **Elements of Analysis.**
   Dr. Noble, Dr. Wilczynski, Mr. Whitney, and Dr. Blake.
   The methods of higher algebra, trigonometry, and analytic geometry, with some account of their historical development.
   3 hrs., throughout the year. M W F, 9, 10; Tu Th S, 9, 10. Prescribed (except as provided above) to Freshmen in the Colleges of Letters, Social Sciences, Natural Sciences, Commerce, and Agriculture.

2. **Algebra.** Mr. Whitney, Dr. Putnam, and Dr. McDonald.
   The progressions and other simple series, inequalities and limits, exponentials and logarithms, permutations and combinations, binomial theorem for any index, expansion of functions in series, convergency of series, determinants, elements of the theory of equations.
   3 hrs., either half-year. M W F, 9, 10.

3A. **Elements of Analysis, with Applications; First Course.**
   Associate Professor Edwards, Dr. Noble, Dr. Lehmer, Dr. Blake, Dr. Putnam, and Dr. McDonald.
   A practical course in algebra, analytic geometry, and the elements

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of the differential calculus, adapted particularly to the needs of students in engineering.

5 hrs., throughout the year. M Tu W Th F, 8. Prescribed, Freshman year, in the Colleges of Engineering. Open to other students who have passed in Solid Geometry and Plane Trigonometry.

3B. Elements of Analysis, with Applications; Second Course.
Associate Professor EDWARDS, Dr. WILCZYNSKI, Mr. WHITNEY, Dr. PUTNAM, and Dr. MCDONALD.

Continuation of Course 3A. Differential and integral calculus, with applications to geometry.

3 hrs., throughout the year. M W F, 8, 9. Prerequisite: Course 3A, or its equivalent. Prescribed, Sophomore year, in the Engineering Colleges.

4. Plane Trigonometry.
Dr. WILCZYNSKI, Dr. LEHMER, Dr. PUTNAM, and Dr. MCDONALD.

The development of the general formulæ of plane trigonometry. Practice in the use of logarithmic tables; applications of trigonometry to the solution of triangles and to mensuration in general.

2 hrs., either half-year. First half-year, Tu Th, 9, 10, 11; second half-year, Tu Th, 10, 11.

5. Plane Analytic Geometry.
Dr. LEHMER, Dr. BLAKE, Dr. PUTNAM, and Dr. MCDONALD.

The analytic geometry of the straight line, the circle, and the conic sections, including a discussion of the general equation of the second degree, and some special examples in higher loci.

3 hrs., either half-year. M W F, 9, 10. Prerequisite: Course 4.

6. Solid and Spherical Geometry.
Mr. WHITNEY, Dr. LEHMER, Dr. BLAKE, and Dr. MCDONALD.

The fundamental propositions of the Euclidean geometry of space.

2 hrs., either half-year. Two sections, each half-year. Tu Th, 9, 10.

7. Spherical Trigonometry. Mr. WHITNEY.

The development of the formulæ of spherical trigonometry, the solution of spherical triangles, problems in spherical mensuration.

1 hr., second half-year. Tu, 4.

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INTERMEDIATE COURSES.

PRIMARILY FOR SOPHOMORES AND JUNIORS.

9. Differential and Integral Calculus; First Course.

Professor STRINGHAM.

Development of the fundamental principles and formulæ of the differential and integral calculus; applications to various problems in geometry and analysis, such as indeterminate forms, maxima and minima, expansions of functions in series, curvature, length of curves, areas, volumes, centers of position, etc.

3 hrs., throughout the year. M W F, 9. Prerequisite: Course 1 or Course 5.

9B. Differential and Integral Calculus; First Course.

Dr. WILCZYNSKI and Mr. WHITNEY.

The equivalent of Course 9 or Course 3B.

3 hrs., throughout the year, beginning second half-year. M W F, 10. Prerequisite: Course 1 or Course 5.

10. Problems in the Differential and Integral Calculus. (G. E.)

Dr. LEHMER, Dr. PUTNAM, and Dr. McDONALD.

2 hrs., second half-year. Tu Th, 9. Prescribed, Sophomore year, in the College of Civil Engineering; elective in the College of Mechanics, with Mechanical Engineering, Course 8B.

11. Determinants and Theory of Equations. (G. E.)

Associate Professor EDWARDS.

The theory of determinants and their more important applications to geometry and algebra; algebraic resolution of equations, elimination, elements of the theory of substitutions, and introduction to the theory of invariants.

2 hrs., throughout the year. Tu Th, 9. Open to students who have taken, or are taking, Course 9.

12A. Advanced Analytic Geometry. (G.E.) Dr. LEHMER.

General properties of conic sections; introduction to the theory of higher plane curves.

3 hrs., first half-year. M W F, 10. Prerequisite: Course 1 or Course 5.

12B. Analytic Geometry of Three Dimensions. (G.E.)

Dr. WILCZYNSKI.

The elementary analytic geometry of the straight line in space, the plane, the sphere, and the conicoids, and a discussion of

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the theory of higher curves and surfaces, including the determination of curvature, by the methods of the differential calculus.

3 hrs., second half-year. M W F, 2. Open only to students who have taken, or are taking, Course 9 or 9B.

13. Synthetic Projective Geometry. (G.E.) Dr. LEHMER.

3 hrs., second half-year. M W F, 1.

14. Differential and Integral Calculus; Second Course. (G. E.) Dr. NOBLE.

Continuation of Course 9.

3 hrs., throughout the year. M W F, 9. Prerequisite: Course 9 or 9B.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES.

15. Analytic Projective Geometry. (G.E.) Professor STRINGHAM.

The fundamental principles of projective geometry treated analytically. The principle of duality, cross-ratios, involution, linear transformations of one, two, and three dimensional figures, particularly of loci of the second order and class.

3 hrs., throughout the year. M W F, 10. Prerequisite: Course 12A.

*16. Quaternions. (G.E.) Associate Prosessor HASKELL.

An elementary presentation of the principles of the subject, with illustrations of its application to geometry and to mechanics.

3 hrs., throughout the year. M W F, 2.

17. History of Mathematics. (G.E.) Professor STRINGHAM.

Outlines of the history of mathematical discovery, and of the development of mathematical thought, with special reference to its significance as a factor in intellectual progress.

1 hr., throughout the year. F, 11.

18. Logic of Mathematics. (G.E.) Professor STRINGHAM.

Analysis of the foundation principles of geometry and algebra. The number-system and the vector-system of algebra compared. The geometrical theory of proportion, and the irrational. The non-Euclidean geometry.

2 hrs., throughout the year. M W, 11. Designed especially for teachers and prospective teachers of mathematics. Prerequisite: A course in formal logic.

* Not given in 1902-03.

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19A. **Differential Equations.** (G.E.) Associate Professor EDWARDS.

Theory and methods of solution of ordinary differential equations, followed by a short introduction to partial differential equations.

3 hrs., first half-year. M W F, 10. Prescribed, Junior year, in the College of Mechanics.

19B. **Differential Equations.** (G.E.) Associate Professor EDWARDS.

3 hrs., second half-year. M W F, 10. Elective to students who have completed Course 19A.

*20. **Selected Topics in Higher Mathematics.** (G.E.)
Dr. WILCZYNSKI.

A general introduction to some important methods in modern higher mathematics.

2 hrs., throughout the year. Tu Th, 9.

20A. **Theory of Probabilities, with special reference to the problems of Life and Endowment Insurance, and of Annuities.** (G.E.)
Mr. WHITNEY.

2 hrs., first half-year. Tu Th, 10. Students electing this course are advised to elect also Course 22 in History and Political Science (Statistics).

HIGHER COURSES.

PRIMARILY FOR GRADUATE STUDENTS.

Of the following courses it is expected that five or six will be offered each year. In 1902-03 these will be Courses 24, 25, 27, 32, 33, and 40. Students in order to elect any of them must have previously taken the prerequisite intermediate courses: in most cases, at least Courses 9, 11, 14, and 15.

*21. **Theory of Functions of Real Variables.**
Professor STRINGHAM.

Simple and multiple integrals; line, surface, and space integrals; Laplace's Equation and its applications; series; geometrical applications.

2 hrs., throughout the year.

*22 **Transformation Groups and Differential Equations.**
Dr. WILCZYNSKI.

An introduction to Lie's Theory; applications to the theory of functions, to the theory of invariants of linear differential equations, and to hydrodynamics.

2 hrs., throughout the year.

* Not to be given in 1902-03.

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*23. **Partial Differential Equations.** Mr. WHITNEY.

Theory of definite integrals, Fourier's Theorem and applications, introduction to harmonic functions.

2 hrs., second half-year.

24. **Theory of Functions of a Complex Variable.** Mr. WHITNEY.

(Introductory course.) Lectures on the general theory of functions, with special reference to the ideas of Riemann.

3 hrs., first half-year. M W F, 3.

25. **Higher Geometry.** Dr. BLAKE.

Modern developments in the analytical geometry of two and of three dimensions. Application of the differential and integral calculus to algebraic curves and surfaces.

3 hrs., throughout the year.

*26. **Absolute Geometry.** Professor STRINGHAM.

An analytical treatment of the absolute geometry of space.

2 hrs., throughout the year. S, 9-11.

27. **Elliptic Functions.** Dr. NOBLE.

Reduction of elliptic integrals, Abel's Theorem, development of elliptic functions in series, applications to various problems of geometry and mechanics.

3 hrs., second half-year. M W F, 2. Prerequisite: Course 24.

*28. **Abelian Functions.** Associate Professor HASKELL.

An advanced course in the theory of functions of a complex variable, with applications to the theory of higher plane curves.

3 hrs., throughout the year. Prerequisite: Course 24.

*29. **Spherical Harmonics.** Associate Professor HASKELL.

Elements of the theory of spherical harmonics, with special reference to their application in the solution of certain physical problems.

2 hrs., second half-year.

*30. **Theory of Algebraic Forms.** Associate Professor HASKELL.

Theory of linear transformation, invariants and covariants of binary and ternary quantics. Applications to the theory of equations, and to higher plane curves.

3 hrs., throughout the year.

* Not to be given in 1902-03.

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*31. Theory of Numbers. Dr. LEHMER.

Properties of whole numbers, both ordinary and complex, theory of congruences, residues of powers, primitive roots, quadratic forms.

3 hrs., second half year.

32. Theory of Substitutions. Dr. PUTNAM.

General properties of substitutions, theory of groups, algebraic resolution of equations, cyclotomic and Abelian equations.

3 hrs., first half-year.

33. Linear Differential Equations. Dr. WILCZYNSKI.

3 hrs., throughout the year.

*36. The Hypergeometric Function. Dr. WILCZYNSKI.

2 hrs., throughout the year.

*38. Calculus of Variations. Dr. WILCZYNSKI.

1 hr., second half-year.

40. Mathematical Seminary. Professor STRINGHAM.

Conferences between members of the mathematical department and students engaged in higher mathematical work, for the discussion of questions related to their studies, and for the examination of recent mathematical literature; under the direction of Professor STRINGHAM. Meetings once a week. T, 2–4. Credit value to be determined in each case.

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* Not to be given in 1902–03.

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PHYSICS.

FREDERICK SLATE, B. S., Professor of Physics.

WILLIAM J. RAYMOND, B.S., Assistant Professor of Physics.

PERCIVAL LEWIS, Ph.D., Assistant Professor of Physics.

——— ———, Instructor in Physics.

GEORGE K. BURGESS, Sc. D., Instructor in Physics.

ARTHUR INCELL, B.S., Assistant in Physics.

CHARLES A. KRAUS, B,S., Assistant in Physics.

ARTHUR S. KING, M.S., Assistant in Physics.

——— ———, Assistant in Physics.

CONRAD LORING, B.S., Assistant in Physics.

ELLIS W. FURBUSH, Assistant in Physics.

WILLIAM R. STAMPER, Mechanician in the Department of Physics.

Courses 1 to 3 are fundamental and designed to meet the needs of students preparing for applications of Physics, or advanced work in the subject itself. Course 4 is especially designed for students in the Colleges of Letters and Social Sciences, but if properly accompanied by laboratory exercises, it may also serve as a basis for advanced study. Courses 2A and 4 are alternatives; credit towards graduation will not be allowed for both of them. Students who have completed Course 1 will profit greatly if they supplement the course of laboratory work regularly laid out. For credit on special and supplementary laboratory work see Course 18. The Physical Laboratory will be open five days a week throughout the year, and may be used, under the guidance of the instructors concerned, by advanced students.

Laboratory deposits are at the rate of five dollars a half-year for each laboratory exercise a week. The average amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is about one-half of the deposit.

The Group Elective. Students who choose Physics in their Group Elective must include an adequate amount of laboratory exercises in the work chosen; the instructors should be consulted on this point.

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Such students are strongly advised to take Course 5 in the Junior year. Notice that the first half-year of this course may be combined with Course 6 or Course 7 to form a year's work.

Courses 1 and 2A in Physics are prerequisite to Group Elective work in all departments of Natural Science. By special arrangement Course 4 may be substituted for Course 2A. In 1902–03 Course 4 or Course 15 will be offered, but not both.

Teachers' Certificates. Applicants for the teachers' recommendation in Physics, in making up the twenty units required, must include in their work Courses 1 and 3, with either Course 4 or Course 2A. See statements under these headings.

Beginning with May, 1903, twenty-four units of Physics will be required for the teachers' recommendation.

1. Elementary Physics. Dr. BURGESS and Mr. KRAUS.

Hydrostatics, heat, light, sound, mechanics, magnetism, and electricity. Recitation once or twice a week, and laboratory exercises twice a week.

6 hrs., throughout the year; 3 units each half-year. Section I, Tu Th, 9–12; II, W, 1–4, and S, 9–12; III, M F, 1–4; IV, Tu Th, 1–4. Open to students who have passed the entrance examination in Physics. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering and Chemistry.

2A. General Physics. Assistant Professor LEWIS and —— ——.

Lectures and recitations with experimental illustration, and assigned problems. Properties of matter, heat, sound, light, magnetism, and electricity, treated with reference to principles which underlie measurement in the Physical Laboratory, and other applications.

3 hrs., throughout the year. M W F.: Section I, Assistant Professor LEWIS, 9; Section II, —— ——, 10. Open to students who have passed an examination covering the ground of Course 1. Prescribed, Sophomore year, in the Colleges of Agriculture and Chemistry (Section I); and Engineering (Section II).

3. Physical Measurement. —— —— and Mr. INCELL.

Experimental work requiring quantitative results. Methods are selected so as to show instructive relations of physical principles, and their adaptation to practical problems. The course is properly varied to suit the needs of students in the different colleges. Laboratory exercises twice a week.

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6 hrs., throughout the year; 2 units each half-year. Section I, M F, 1–4; II, Tu Th, 9–12; III, Tu Th, 1–4. Prescribed, Sophomore year, in the Colleges of Engineering and Chemistry.

4. **General Physics.** Professor SLATE.

Lectures and recitations, with experimental illustration, on topics in heat, light, sound and electricity; giving prominence to subjects which are of importance as connected with the growth and the present condition of the science.

3 hrs., throughout the year. Tu Th, 11 and S, 9. Prerequisite: At least full Sophomore standing. The attention paid to methods of presentation makes this a profitable course for prospective teachers of elementary physics.

5. **Analytic Mechanics.** (G.E.)
Professor SLATE and Assistant Professor RAYMOND.

The mathematical treatment of the important principles of dynamics and statics, fully illustrated by problems and applications.

4 hrs., throughout the year. Two sections. M Tu Th F, 8. Prerequisite: Course 9 or 3B in Mathematics. Prescribed, Junior year, in the Colleges of Engineering.

6. **Harmonic Motion.** (G.E.) Assistant Professor RAYMOND.

The analytical treatment of wave-motion, with applications to sound, light, and electricity. Lectures.

2 hrs., second half-year. Tu Th, 10. Prerequisite: Course 5, first half-year, and Course 2A or 4. This course forms an alternative continuation of Course 5 in the second half-year.

7. **Absolute Electrical Measurements.** (G.E.)
Assistant Professor RAYMOND.

Lectures and laboratory exercises twice a week.

7 hrs., second half-year; 3 units. Lecture, W, 8. Laboratory, Tu Th, 1–4. Prerequisite: Course 5, first half-year, and Courses 1, 2A, 3, and 10. This course forms an alternative continuation of Course 5 in the second half-year. Elective, Junior year, in the College of Mechanics.

8. **Theory of Light.** (G. E.) ——— ———.

Lectures, with experimental illustration. Problems relating to the theory of optical instruments, treated by the methods of geometrical optics and of the wave-theory.

2 hrs., throughout the year, but may be taken for the first half-year only. Tu Th, 11. Prerequisite: Course 2A or 4 in Physics; Course 9 or 3B in Mathematics.

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9A. Molecular Physics. Mr. KRAUS.

A descriptive study of the gaseous, liquid and solid states of matter. Supplementary to Course 2A, especially to work of Section I, and intermediate between Course 2A and Course 12.

2 hrs., first half-year. Prerequisite: Course 2A in Physics and Course 9 or 3B in Mathematics.

10. Electricity. (G. E.) Assistant Professor RAYMOND.

Elements of the mathematical theory of electricity and magnetism, with some of the more important applications. Lectures.

2 hrs., first half-year. Tu Th, 10. Prerequisite: Course 2A or 4 in Physics; Course 9 or 3B in Mathematics. Elective, Junior year, in the College of Mechanics.

11. Spectroscopy. (G. E.) Assistant Professor LEWIS.

Lectures, with experimental illustration, on methods and results of investigation, and spectroscopic theories.

2 hrs., throughout the year, but may be taken for the first half-year only. M W, 11. Prerequisite: Course 8.

12. Theory of Heat and Thermodynamics. (G. E.) Dr. BURGESS.

Lectures twice a week.

2 hrs., second half-year. M W, 4. Prerequisite: Course 2A or 4 in Physics; Course 9 or 3B in Mathematics.

12A. Energetics. (G. E.) Dr. BURGESS.

A continuation of Course 12, with applications to chemical and physical problems.

2 hrs., first half-year. To be given in 1903–04.

12B. Heat Measurements. (G. E.)* Dr. BURGESS.

Thermometry, Calorimetry, Pyrometry and general heat measurements, adapted for Chemists, Engineers and Physicists. One lecture and one laboratory exercise a week.

4 hrs., first half-year; 2 units.

13. Physical Optics. (G. E.) Assistant Professor RAYMOND.

Laboratory exercises twice a week.

6 hrs., first half-year; 2 units. M F, 1–4.

* May be chosen in the Group Elective by special arrangement only.

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14. **Advanced Physical Measurement.** (G. E.)
Assistant Professor RAYMOND.

Problems involving accurate measurement and mathematical work. Laboratory exercises twice a week.

6 hrs., first half-year; 3 units. Tu Th, 1–4. Elective, Senior year, in the College of Mechanics.

15. **Dynamics of Rotation.** (G. E.) Professor SLATE.

Theory of the gyroscope, including precession and nutation.

2 hrs., throughout the year. Tu Th, 4. Prerequisite: Course 5. Primarily for Graduates.

16. **Special Advanced Study and Research.** (G. E.)
Assistant Professor LEWIS.

Laboratory work throughout the year, on problems assigned according to the preparation and needs of individual students. Credit value to be fixed in each case. Primarily for Graduates.

17. **Readings and Discussions.** (G. E.) Professor SLATE.

Work throughout the year, for Seniors and Graduate Students, upon topics selected by special arrangement. The following have been treated during the period 1896–1902: recent advances in the theory of electrolysis; the development of the doctrine of conservation of energy; mathematical theory of electricity; theory of double refraction and polarization; electro-magnetic theory of light.

2 hrs., throughout the year. Primarily for Graduates.

18. **Special Undergraduate Study.** (G. E.)*
Assistant Professors RAYMOND and LEWIS, and Mr. KRAUS.

All special laboratory work not included in courses announced above. Credit value to be fixed in each case. Students electing Course 18 are urged, as far as possible, to confine the work to the first half-year. On account of limited room and apparatus during the second half-year, it may be necessary to restrict the number of students to those electing the course for the entire year. Mr. Kraus will offer during the first half-year a course in laboratory manipulations, consisting mainly of glass working.

* May be chosen in the Group Elective by special arrangement only.

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ASTRONOMY.

ARMIN O. LEUSCHNER, Ph.D., Sc.D., Associate Professor of Astronomy and Geodesy, and Director of the Students' Observatory.

ALEXANDER MCADIE, M.A., Honorary Lecturer on Meteorology.

SIDNEY D. TOWNLEY, Sc.D., Instructor in Practical Astronomy.

ADELAIDE M. HOBE, B.S., Assistant in Astronomy.

Special Announcement. A special announcement concerning the facilities and the courses of instruction in the Berkeley Astronomical Department, and in the Lick Astronomical Department, at Mount Hamilton, has been published. Copies may be obtained from the Director of the Lick Observatory, Mount Hamilton, California, or from the Director of the Students' Observatory, Berkeley, California.

Courses 1, 2, and 5 are designed especially to fulfil the requirement in prescribed Natural Science for students in the Colleges of General Culture.

A part of Course 1 consists of special lectures at the regular hour by the Director and Astronomers of the Lick Observatory.

Geodesy, navigation, and nautical astronomy, especially adapted to the needs of students in the College of Commerce, will be included in Courses 2 to 4, but a special section for such students may be formed.

The Group Elective. Courses 1 and 2A in Physics are prerequisite to Group Elective work in Astronomy.

1. Modern Astronomy.

Associate Professor LEUSCHNER, the Director and Astronomers of the Lick Observatory, and Mr. MCADIE.

(*a*) An introductory course during the first half-year. General facts and principles underlying the science of astronomy in all its branches. (*b*) Second half-year. Progress in astronomy through modern methods, especially spectroscopic and photographic.

2 hrs., throughout the year. Tu Th, 11. For observatory work in connection with this course, students will ordinarily elect Course 2; but may, instead, take Course 4A or 4 B, subject to the prerequisites announced.

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2. Supplement to Course 1. Dr. TOWNLEY and Miss HOBE.

Practice in observing in connection with Course 1. One or two evenings or afternoons a week at the observatory.

3 or 6 hrs., throughout the year, as the student may elect; 3 or 6 units. The observatory is open for this course Tu Th, 7-10 p.m., Th and F, afternoons, and F and S, mornings. The course is open to students who are taking or have taken Course 1 or 3.

3. General Astronomy. (G.E.) Dr. TOWNLEY.

3 hrs., first half-year. Tu Th S, 8. Prerequisite: A knowledge of general physics. For observatory work in connection with this course, students may elect Course 2, 4A, or 4B, subject to the prerequisites announced.

4A. Practical Astronomy. (G.E.) Dr. TOWNLEY and Miss HOBE.

Lectures and observatory work. Geodesy, navigation, and nautical astronomy. Practical work at the observatory with sextant, clock, chronograph, transit-and-zenith telescope, equatorial telescope, alt-azimuth instrument. Computing.

7 hrs.; 3 units, first half-year; 8 hrs.; 4 units, second half-year. First half-year, lecture Tu or Th, 9; observatory, Tu Th, 7-10 p.m.; second half-year, lectures Tu Th, 9; observatory Tu Th, 7-10 p.m. Prerequisite: Course 7 in Mathematics; either Course 1 or 3 in Astronomy. The course should also be preceded by a course in differential calculus.

4B. Practical Astronomy. (G.E.) Dr. TOWNLEY and Miss HOBE.

The subject-matter of Course 4A more briefly presented, and adapted to the needs of students of Civil Engineering.

7 hrs.; 3 units, first half-year; 3 hrs.; 1 unit, second half-year. First half-year, lecture, Tu Th, 9, and two observatory periods; second half-year, one observatory period. The observatory is open for this course, Tu or Th, 7-10 p.m., and S morning. But the arrangement of the work depends so largely upon weather conditions, that the student should reserve for this course several of the periods mentioned. Prerequisite for students not in the College of Civil Engineering; Course 7 in Mathematics; either Course 1 or 3 in Astronomy. Prescribed, Senior year, in the Course in Railroad Engineering, College of Civil Engineering.

5. History of Astronomy. Dr. TOWNLEY.

3 hrs.. second half-year. Hours to be arranged with the instructor. Prerequisite: Course 1 or 3.

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6. **Theoretical Astronomy.** (G.E.) Associate Professor LEUSCHNER.

4 hrs., throughout the year. Tu Th, 2-4. Prerequisite: Courses 3 and 4A; Course 5 in Physics; Course 9 or 9B in Mathematics.

7. **Method of Least Squares.** (G.E.) Dr. TOWNLEY.

The fundamental principles and processes of the Method of Least Squares, and their application to the solution of astronomical, physical, and engineering problems.

2 or 3 hrs., first half-year. Tu Th, 10; W, 8. Prerequisite: Working knowledge of the differential and integral calculus. Prescribed, Junior year, two units, in the Course in Railroad Engineering, College of Civil Engineering.

*8 **Mechanical Quadratures.** (G.E.)
Associate Professor LEUSCHNER.

Development of the formulæ of numerical differentiation and integration, and their application in the construction of tables.

3 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 9 or 9B in Mathematics. Offered alternately with Course 9.

*9. **Interpolation and the Use of Tables.** (G.E.)
Associate Professor LEUSCHNER.

The more useful formulæ of interpolation, and their application in the use of astronomical and other tables. Practice in extensive numerical computations, with special aim at rapidity and exactness. Calculating machines. Life insurance.

3 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Algebra and trigonometry. Offered alternately with Course 8.

10. **Summer School.** (G.E.) Dr. TOWNLEY.

A continuation of Course 4. Four weeks duriug the summer vacation. The students determine the longitude (by the telegraphic method) or the latitude (by the method of Talcott) of the Students' Observatory.

11. **Advanced Practical Astronomy.** (G.E.) Dr. TOWNLEY.

The theory of refraction; eclipses.

2 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 4.

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* Subject to demand, courses 8 and 9 may be combined into a single three hour course during the second half-year.

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12. **Theoretical Astronomy.** Associate Professor LEUSCHNER.

The course treats of the relative accuracy of the various methods of determining preliminary orbits.

2 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 6. Primarily for Graduates.

13. **Perturbations and Celestial Mechanics.**
Associate Professor LEUSCHNER.

Adapted to the needs and preparation of the students. The course may be continued through three years.

The following subjects are treated: General principles; special perturbations in rectangular and polar coördinates; method of variation of constants; method of determining the absolute perturbations of the minor planets after Hansen, Newcomb, and Hill; Gyldèn's method after Brendel's Theorie der kleinen Planeten. Bohlin's Gruppenweise Berechnung der Stoerungen. Selected topics from Tisserand's Mécanique Céleste, Poincaré's Les Nouvelles Méthodes de la Mécanique Céleste and Gyldèn's works, etc.

4 hrs., throughout the year. M F, 2-4. For Graduates.

14. **Advanced Practical Astronomy.** (G.E.) Dr. TOWNLEY.

3 hrs., throughout the year; 1 unit each half-year. Hours to be arranged with the instructor.

15. **Advanced Study and Research.** Dr. TOWNLEY.

Investigation of special problems to be selected according to the preparation and the needs of individual students.

Hours and credit value arranged in each case. Primarily for Graduates.

16. **Measurement and Reduction of Astronomical Photographs; Spectrogrammes.** Dr. TOWNLEY.

Either half-year. Hours and credit to be arranged with the instructor. For Graduates.

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GEOGRAPHY.

GEORGE DAVIDSON, Ph.D., Sc.D., Honorary Professor of Geodesy and Astronomy; Professor of Geography.

LINCOLN HUTCHINSON, M.A., Instructor in Commercial Geography.

1. The Currents and Climatology of the Pacific Ocean.

Professor DAVIDSON.

The geography, productions, and commerce of the countries bordering the Pacific Ocean and contiguous waters. The highways of commerce. The great river and lake systems of the world. The geography of raw products. Tides, Ocean Cables.

3 hrs., first half-year. M W F, 2. Prerequisite: At least Junior standing.

2. The Currents and Climatology of the Pacific Ocean.

Professor DAVIDSON.

Continuation of Course 1.

3 hrs., second half-year. M W F, 2. Prerequisite: At least Junior standing.

ECONOMIC GEOGRAPHY.

Introduction to Economic Geography. [See Political Economy 3.]

MR. HUTCHINSON.

The elements of scientific geography; relation between geographical phenomena and economic development; resources of the leading countries of the world.

3 hrs., each half-year. Tu Th S, 10. Open to all students.

Geography of International Commerce. [See Political Economy 4.]

Mr. HUTCHINSON.

Demand and supply in the world markets; geographical distribution of the more important articles of commerce; routes and means of transportation and communication, etc.; intended as a continuation of Course 3.

3 hrs., second half-year. Tu Th, 2; S, 9. Prerequisite: Course 3.

Commercial Resources of the Spanish-American Countries. [See Political Economy 17.] Mr. HUTCHINSON.

Detailed study of the geography, natural resources, commerce, and possibilities of development of these countries, devoting a year

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to each. In 1902-03 Brazil will be studied. Particular attention is given to commercial relations with the United States.

2 hrs., second half-year. Tu Th, 11. Open only to advanced students who satisfy the instructor of their fitness for the work. A reading knowledge of Spanish is highly desirable.

FOR GRADUATE STUDENTS.

Sources of Commercial Information Regarding Foreign Countries. [See Political Economy 22.] Mr. HUTCHINSON.

The object of this course is to familiarize the student with the most reliable sources of information; government reports, statistical publications, chambers of commerce journals, bulletins of commercial museums, etc.

1 or 2 hrs., throughout the year.

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CHEMISTRY.

WILLARD B. RISING, M.E., Ph.D., Professor of Chemistry.

EDMOND O'NEILL, Ph.B., Associate Professor of Organic and Physiological Chemistry.

HENRY C. BIDDLE, Ph.D., Instructor in Chemistry.

WALTER C. BLASDALE, Ph.D., Instructor in Chemistry.

EDWARD BOOTH, Ph.B., Instructor in Chemistry.

WILLIAM C. MORGAN, Ph.D., Instructor in Chemistry.

It is desirable that students complete the preparatory work in chemistry before undertaking work in this department in the University. To students who have not taken chemistry in the high schools, an opportunity to do preparatory work is offered in the Summer Session.

Courses 1, 2, 3, and 4 are prerequisite to all other courses in Chemistry. Course 5A or 5B is prerequisite to Courses 9 to 31.

Laboratory deposits are fifteen dollars a half-year for Course 3 or 4, and ten to thirty dollars a half-year for the other laboratory courses. The average amount returned to the student at the end of the half-year, after deducting for cost of materials, gas, etc., actually used, and for breakage of apparatus, is about three dollars in Course 3 or 4, and about five dollars in the other courses.

The Group Elective. Courses 1 and 2A in Physics are prerequisite in the Group Elective in Chemistry.

1. General Inorganic Chemistry—Non-Metals.
Professor RISING and Dr. BIDDLE.

Lectures, with study of a manual, and full experimental illustration.

3 hrs., first half-year. Three sections. M W F, Section I, Dr. BIDDLE, 9; Section II, Dr. BIDDLE, 10; Section III, Professor RISING, —. Usual prerequisite: Matriculation Chemistry, Subject 12*b*. This course is ordinarily taken in conjunction with Course 3. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering and Chemistry.

1A. General Inorganic Chemistry. Associate Professor O'NEILL.

Lectures and recitations, with study of a manual, and full experimental illustration.

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2 hrs., throughout the year. Tu Th, 10. Prerequisite: At least Sophomore standing.

2. General Inorganic Chemistry—Metals.
Professor RISING and Dr. BIDDLE.

Lectures, with study of a manual, and full experimental illustration.

3 hrs., second half-year. Three sections. M W F, Section I, Dr. BIDDLE, 9; Section II, Dr. BIDDLE, 10; Section III, Professor RISING,—. Usual prerequisite: Matriculation Chemistry, Subject 12*b*, and Course 1. This course is ordinarily taken in conjunction with Course 4. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering and Chemistry.

3. Laboratory: Experiments. Mr. BOOTH and Dr. BIDDLE.

A series of experiments, qualitative and quantitative, illustrating the general laws of chemical action.

6 hrs., first half-year; 2 units. Four sections. Section I, M F, 1–4, Dr. BIDDLE; II, Tu Th, 9–12, Mr. BOOTH; III, Tu Th, 1–4, Mr. Booth; IV, W, 1–4, and S, 9–12, Mr. BOOTH. Prerequisite: Matriculation Chemistry, Subject 12*b*. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering and Chemistry.

4. Laboratory: Qualitative Analysis. Mr. BOOTH and Dr. BIDDLE.

Laboratory practice in qualitative analysis, including blowpipe tests; with occasional lectures and discussions.

6 hrs., second half-year; 2 units. Four sections. Same arrangement as for Course 3. Prerequisite: Courses 1 and 3. Prescribed, Freshman year, to all students in the Colleges of Agriculture, Engineering and Chemistry.

5A. Laboratory: Quantitative Analysis—Gravimetric and Volumetric. (G.E.) Dr. BLASDALE.

Elementary course in the principles of quantitative analysis; practice in gravimetric and volumetric analysis, with weekly lectures and discussions.

9 hrs., first half-year; 3 units. M W F, 1–4. Prescribed, optionally with 5B, in the College of Chemistry. Prerequisite, alternatively with 5B, to Courses 9 to 31.

5B. Laboratory: Quantitative Analysis—Gravimetric. (G.E.)
Dr. BLASDALE.

General principles; practice in gravimetric determinations, with weekly lectures and discussions.

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9 hrs., first half-year; 3 units. Two sections. Section I, M W F, 1–4; II, Tu Th, 1–4 and S, 9–12. Prescribed, Sophomore year, in the College of Mining, and, optionally with 5A, to students in the College of Chemistry, and to those in the College of Agriculture who intend to elect work in the Agricultural and Viticultural Laboratories.

6. Laboratory: Quantitative Analysis—Volumetric. (G.E.) Dr. BLASDALE.

General principles, with weekly lectures and discussions.

9 hrs., second half-year; 3 units. Two sections. Section I, M W F, 1–4; II, Tu Th, 1–4 and S, 9–12. Prerequisite: Course 5A or 5B. Prescribed, Sophomore year, in the College of Mining.

7A. Inorganic Chemistry. (G.E.) Professor RISING.

Advanced lectures on the chemistry of the metals, designed particularly for mining students.

2 hrs., throughout the year. M F, 8.

7B. Inorganic Chemistry: Laboratory. (G.E.) Professor RISING.

A few students will be admitted to this course, and will be assisted in making special preparations of metallic compounds. Competent students will be able to pass to original investigation. The credit value will be fixed in each case.

8. Organic Chemistry. (G.E.) Associate Professor O'NEILL.

Elementary introductory course. Lectures and recitations, with experiments.

2 hrs., first half-year. Tu Th, 8. Prescribed, Sophomore year, in the College of Chemistry.

9C. Organic Chemistry. (G.E.) Dr. MORGAN.

Continuation of Course 8.

2 hrs., second half-year. Tu Th, 8. Prerequisite: Course 8.

9A. Organic Chemistry. (G.E.) DR. MORGAN.

Advanced course. Chemistry of the aliphatic derivatives. Lectures and recitations, with references to original articles on special topics.

3 hrs., first half-year. M W F, 8. Prerequisite: Courses 8 and 9C.

9B. Organic Chemistry. Dr. BIDDLE.

Advanced course. Chemistry of the benzene derivatives and cyclic compounds in general. Lectures and recitations, with references to original articles on special topics.

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3 hrs., second half-year. M W F, 8. Prerequisite: Courses 8 and 9C.

10. Laboratory: Organic. (G.E.) Dr. MORGAN.

Supplementary to Courses 9A, 9B, and 9C. Preparation of organic compounds, and methods of analysis. Prerequisite: Course 8.

9 hrs., either half-year; 3 units. M W F, 1–4.

10B. Laboratory: Organic. (G.E.) Dr. MORGAN.

Continuation of Course 10.

6 to 15 hrs., either half-year; 2 to 5 units.

11. Physical Chemistry. (G.E.) ——— ———

A discussion of the principles of chemistry and the relations of chemistry to physics.

2 hrs., throughout the year. Tu Th, 8. Prerequisite: Courses 5A or 5B, and 8.

12. Laboratory: Physical Chemistry. (G.E.) ——— ———

A series of laboratory experiments in connection with Course 11.

9 hrs., either half year; 3 units. M W F, 1–4.

Prerequisite: same as for Course 11.

13. Microchemical Analysis. (G.E.) Professor RISING.

Credit value and time to be fixed.

14A. Chemical Technology. (G.E.) Associate Professor O'NEILL.

The chemistry and manufacture of the more important technica chemical products.

2 hrs., second half-year. Tu Th, 8. Prerequisite: Courses 9A or 9B, 10, and 11.

14B. Chemical Technology: Laboratory. (G.E.)
Associate Professor O'NEILL.

Laboratory work supplementary to 14A.

6 hrs.; 2 units, second half-year. Tu Th, 1–4. Prerequisite: Same as for 14A, and 5, and 6.

16. Ore Analysis. (G.E.) Dr. BLASDALE.

Special method of analysis of minerals and ores of complex composition.

6 hrs., first half-year; 2 units. Tu Th, 1–4. Prerequisite: Courses 5A or 5B, and 6; Physics 3.

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17A. Chemistry of Structural Materials. Mr. BOOTH.

Chemical character and methods of manufacfure of materials of construction.

2 hrs., first half-year. Tu Th, 4.

18. Physiological Chemistry. (G.E.) Associate Professor O'NEILL.

Lectures on the chemistry of the animal functions.

2 hrs., first half-year. Tu Th, 9. Prerequisite: Courses 8, 9C, 10, and 11.

19. Physiological Chemistry: Laboratory. (G.E.) Associate Professor O'NEILL.

Laboratory preparation of compounds of physiological interest. Supplementary to Course 18.

6 hrs., first half year; 2 units. Tu Th, 1–4. Prerequisite: Courses 5, 6, 8, 9C, and 10.

23. Thermo-Chemistry. (G.E.) Professor RISING.

Lectures, with references to the original literature. For graduates and advanced undergraduates. Prerequisite: Courses 8 and 11.

2 hrs., second half-year. Tu Th, 10.

24. Selected Topics in Organic Chemistry. (G.E.) Dr. MORGAN.

Lectures, with references to original literature.

2 hrs., first half-year. Tu Th, 8. Prerequisite: Courses 9A or 9B, and 10.

25. Explosives. (G.E.) Professor RISING.

2 hrs., first half-year. Tu Th, 10. Prerequisite: Courses 5A or 5B, and 6.

26. Rare Metals. (G.E.) Mr. BOOTH.

Lectures and discussions on some of the more important rare elements.

2 hrs., second half-year. M, 4. Prerequisite: Course 5A or 5B.

27. History of Chemistry. (G.E) Associate Professor O'NEILL.

The development of modern chemistry.

2 hrs., second half-year. W, 4-6. Prerequisite: Courses 9A or 9B, 10, 11.

28. Teachers' Course. (G.E.) Mr. BOOTH.

Training course in elementary chemistry, with opportunity for giving instruction in the elementary laboratory. Lectures and laboratory practice, each twice a week.

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2 hrs., either half-year; 2 units. Prerequisite: Courses 5A or 5B, 8, 10, 11.

29. Summer School.

A course of practical laboratory exercises especially adapted to the needs of teachers in the secondary schools of the State, supplemented by lectures upon the principles involved. The session of 1902 will begin June 26 and close August 6.

30. Special Undergraduate Study and Research. (G.E.)

All special laboratory work not included in the courses announced above. Credit value to be fixed in each case.

31. Graduate Course.

Work adapted to the special needs of each student. Credit value to be fixed in each case.

Agricultural Chemistry.

See Agriculture, Horticulture, and Entomology.

Assaying. See under Mining.

Blowpipe Analysis. See under Mineralogy.

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BOTANY

WILLIAM A. SETCHELL, Ph.D., Professor of Botany.

WILLIS L. JEPSON, Ph.D., Assistant Professor of Botany.

WINTHROP J. V. OSTERHOUT, Ph.D., Assistant Professor of Botany.

JOS. BURTT DAVY, Assistant in Botany, and Assistant Botanist to Agricultural Experiment Station.

NATHANIEL L. GARDNER, B.S., Assistant in Botany.

Courses 1, 2, and 3 are elementary courses and may be counted for prescribed science in the Colleges of Letters, Social Sciences and Natural Sciences. Courses 14 and 15 are also elementary, but as they deal more largely with applied Botany, are recommended to students in the Colleges of Commerce, Chemistry and Agriculture. Courses 4 and 5 are of especial value to students of Forestry. Group elective work in this department must be preceded by Courses 1, 2, and 3, and at least a year's work in Chemistry. Those desiring teachers' certificates are advised to take Courses 4, 5, and 9 with the prerequisites, but should consult with the head of the department early in their course.

A laboratory fee of two dollars and a half will be imposed each half-year for each laboratory course, to defray cost of materials actually used.

1. **Fundamentals of Botany.** Professor SETCHELL.

Lectures, illustrated as far as possible by means of specimens, diagrams, and preparations, designed to set forth in a general way the important facts, problems, and theories with which botanical science is concerned.

3 hrs., throughout the year. Tu Th S, 8. Prescribed, Sophomore year, in the College of Agriculture.

2. **General Plant Physiology.**

Assistant Professor OSTERHOUT and Mr. GARDNER.

Experimental investigation of the fundamental life-processes of the plant, with especial reference to the relation of the plant to its environment.

6 hrs., first half-year; 3 units. Two sections. Tu Th S, 8–10; Tu Th S, 10–12. Prerequisite: Chemistry, at least Courses 1 and 2.

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3. General Plant Morphology.

Assistant Professor JEPSON and Mr. GARDNER.

Morphological study of a selected series of plants, tracing the progressive differentiation of plant forms, with especial reference to the organs of reproduction.

6 hrs., second half-year; 3 units. Two sections. Tu Th S, 8–10; Tu Th S, 10–12. Prerequisite: Course 2.

4. General Phænogamic Botany. (G.E.)

Assistant Professor JEPSON.

The structure, morphology, and relationships of the orders of seed plants, with especial reference to the higher groups. The second half-year is devoted to a study of the habits of growth, structure, and classification of forest trees, accompanied by lectures upon the forest regions of North America and by field work.

6 hrs., throughout the year; 3 units each half-year. Tu Th S, 8–10, with field work to be arranged. (Of especial value to students of Forestry.)

5. General Cryptogamic Botany. (G.E.) Professor SETCHELL.

A general study of the orders of spore-bearing plants from the points of view of structure, development, and economic importance. Laboratory work and informal lectures.

6 hrs. laboratory, 1 hr. lecture, throughout the year; 3 units each half-year. Tu Th, 1–4. Prerequisite: Course 3.

*6. Phycology and Mycology. (G.E.) Professor SETCHELL.

Laboratory work upon the structure, development, and classification of the algæ, fungi, and lichens, with informal lectures and the assignment of outside reading. Intended for students who desire some critical knowledge of the lower cryptogamous orders. To be offered in alternate years.

6 hrs., throughout the year; 3 units each half-year. Hours to be arranged with the instructor. Prerequisite: Course 5.

7. Pteridology and Bryology. (G.E.) Professor SETCHELL.

The structure, development, and classification of the higher cryptogams (hepatics, mosses, ferns, and fern allies) will be treated in the same way as the lower cryptogams in Course 6. To be offered in alternate years.

* Not to be given in 1902–03.

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6 hrs., throughout the year; 3 units each half-year. W F, 9–12, Prerequisite: Course 5.

9. Vegetable Histology. (G. E.) Assistant Professor OSTERHOUT.

A laboratory course in the microscopical anatomy of the higher plants, treated with reference to function and the influence of environment. It includes practice in embedding, use of the microtome, staining on the slide, microchemical tests, etc. Laboratory work and lectures.

6 hrs., throughout the year; 3 units each half-year. M F, 1–4. Prerequisite: Courses 1, 2, and 2A.

11. Vegetable Cytology. (G. E.) Assistant Professor OSTERHOUT.

The anatomy and physiology of the cell, including cell division, chromosome reduction, fertilization, and a consideration of heredity and development from the standpoint of cytology. Laboratory work and lectures.

6 hrs., throughout the year; 3 units each half-year. M F, 1–4. Prerequisite: Course 9.

12. Morphology of the Compositæ. (G. E.)
Assistant Professor JEPSON.

Studies in the general morphology of the group, followed by the critical examination of various West American genera.

6 hrs., throughout the year; 3 units. Tu Th S, 10–12. To be offered in alternate years.

*13. Taxonomy and Phylogeny of the Phænogams. (G. E.)
Assistant Professor JEPSON.

Laboratory work on the classification of the seed plants, considering the characters and affinities of the classes and more important orders, accompanied by informal discussions of phylogenetic problems.

6 hrs., throughout the year; 3 units. Tu Th S, 10–12. Prerequisite: Courses 4 and 5. To be offered in alternate years.

14. Economic Botany. Mr. DAVY.

An introduction to Economic Botany, dealing with the morphology relationships, properties, and geographical distribution of the plant families which furnish important commercial products and agricultural crops.

4 hrs., laboratory work, with informal lectures first half-year; 2 units. Tu Th, 3–5.

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*Not to be given in 1902–03.

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15. **Commercial and Agricultural Botany.** Mr. DAVY.

A course in Economic Botany, dealing with plant products, their uses, origin, cultivation, collection, and commerce.

2 hrs., recitation or lecture, second half-year; 2 units. Tu Th, 4. Prerequisite: Course 14.

*16. **Weeds, seeds and seed testing.** (G.E.) Mr. DAVY.

Laboratory work on the morphology of weed seeds, with informal lectures on the distribution of the most troublesome agricultural weeds, and instruction in sampling and testing commercial seeds for purity and viability.

3 hrs., throughout the year; 1 unit each half-year. W, 1–4. Prerequisite: Courses 14 and 15 or 4. To be offered in alternate years.

17. **Agrostology (Forage Plants).** (G.E.) Mr. DAVY.

Laboratory work on the special morphology, classification, and ecology of the Gramineæ and other forage plants, accompanied by informal lectures on their special uses and relative agricultural values.

3 hrs., throughout the year; 1 unit each half-year. W, 1–4. Prerequisite: Courses 14 and 15 or 4. To be offered in alternate years.

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25. **Advanced Cryptogamic Botany.** Professor SETCHELL.

The cryptogams of California offer exceptional opportunities for research, and many simpler problems are presented for original investigation. This work during the year will be confined almost exclusively to the algæ, in connection with the special work of the instructor. Students should expect to devote considerable time to this course.

26. **Advanced Phænogamic Botany.** Assistant Professor JEPSON.

Special problems requiring the original investigation of some particular order or smaller group of flowering plants. This course involves work in the field as well as in the laboratory.

27. **Advanced Histology and Cytology.**

Assistant Professor OSTERHOUT.

Special problems in histology or cytology will be assigned to properly prepared graduate students. M F, 1–4.

*Not to be given in 1902–03.

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28. **Advanced Economic Botany.** Mr. Davy.

Special problems in agrostology (either systematic or economic) and other branches of economic botany.

3 hrs., throughout the year; 2 units each half-year. M, 1–4. Prerequisite: Courses 14, 15, and 17.

30. **Botanical Seminary.**

Professor Setchell,

Assistant Professors Jepson and Osterhout.

Graduates and advanced undergraduates meet every week for the discussion of special topics. During the year 1901–02 the time was devoted to the study of geographical distribution. In 1902–03 the time will be spent in continuing the study of Schimper's Pflanzengeographie.

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ZOOLOGY.

WILLIAM E. RITTER, Ph.D., Associate Professor of Zoölogy.

CHARLES A. KOFOID, Ph.D., Assistant Professor of Histology and Embryology.

JOHN C. MERRIAM, Ph.D., Assistant Professor of Palæontology and Historical Geology.

FRANK W. BANCROFT, Ph.D., Instructor in Physiology.

HARRY B. TORREY, M.S., Instructor in Zoölogy.

——— ————, Assistant in Zoölogy.

The courses are planned to meet the needs of three classes of students, viz.:

(1) Those who wish, for the purposes of general culture, some knowledge of the subject-matter, methods and generalizations of biological science on its animal side. For this class Courses 1, 2, 3, and 19 are particularly designed.

(2) Those preparing to become students and investigators. For such the individual aims of the student will determine, after the fundamental courses have been taken, what advanced courses he shall select. The minimum for the Teacher's Recommendation is 1 (first half), 2, 3, either 4 or 7, 17 and 20.

(3) Those preparing for the study of medicine. For these, Courses 1 (first half) 2, 3, 4, and 5 or 6 are requisite to fulfil the requirements of the Course Preparatory to Medicine.

Laboratory deposits are seven dollars for each laboratory course. The amount returned at the end of the course will depend upon the actual cost of the material consumed, the character and amount of the apparatus used, and the breakage.

The Group Elective. At least a year of Chemistry in the University, or its equivalent, and Zoölogy 1, 2, 3, 7, and 17, are prerequisite to the Group Elective in this department.

1. The Fundamentals of Zoology. Associate Professor RITTER.

The underlying principles of animal life and evolution. The treatment is topical rather than systematic. Illustrated lectures.

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2 hrs., throughout the year. Tu Th, 11. Those who are to make Zoölogy alone their Group Elective, or are taking the Course Preparatory to Medicine, or are seeking the Teacher's Recommendation, may receive credit for the first half of the course without the second. Those who are not expecting to pursue the subject further are strongly advised to elect Zoölogy 2, to accompany this course.

2. General Zoology: Laboratory. Mr. TORREY and Mr. ———

A general survey of the animal kingdom, with laboratory work upon a few selected types of invertebrates and lower vertebrates. Each animal will be studied as thoroughly as the time permits with respect to its structure, functions, development, relationship to other animal types and relation to its environment. Lectures and recitations will supplement the laboratory work.

7 hrs., first half-year; 3 units. Section I, M F, 1–4; II, Tu Th, 1–4; I and II, F, 9. Prerequisite: Course 1 (with exception noted under statement concerning that Course, which see). Course 2 should be taken coincidently with Course 1 when possible.

3. General Zoology.

Supplementary to Course 2. The Salamander will be the basis of the laboratory work. Its anatomy will be studied in detail, the general features of its development followed, and several physiological experiments performed.

7 hrs., second half-year; 3 units. Section I, M F, 1–4; II, Tu Th, 1–4; I and II, F, 9. Prerequisite: Course 2.

4. Comparative Anatomy of the Higher Vertebrates.

Associate Professor RITTER and Assistant Professor MERRIAM.

A continuation of Course 3. Designed largely for students preparing to study medicine. The osteological part of the work is done by Assistant Professor MERRIAM. (See Geology, Course 11.)

8 hrs., first half-year; 4 units. Tu W Th, 1–4 and S, 8–12. Laboratory work, recitations, and assigned topics; allotment of time for each to be arranged with the class.

5. Cytology and Microscopical Technique. (G.E.)

Assistant Professor KOFOID.

Structure and physiology of the cell in growth and reproduction. Methods of preparation of animal tissues for microscopical study.

8 hrs., first half-year; 4 units. M F, 9; M F, 1–4. Prerequisite: Course 3.

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6. **Embryology.** (G.E.) Assistant Professor KOFOID.

The phenomena of animal development, fundamental facts of reproduction, comparative vertebrate embryology. Lectures, recitations, and laboratory.

8 hrs., second half-year; 4 units. M F, 9; M F, 1–4. Prerequisite: Courses 2 and 3.

6A. **Lectures on Embryology.** (G.E.) Assistant Professor KOFOID.

Demonstrations and papers.

4 hrs., second half-year; 2 units. M F, 9; M F, 1. Prerequisite: Course 3.

7. **Advanced Zoology: Lower Invertebrates.**

Assistant Professor KOFOID.

Lectures and laboratory work upon the morphology and taxonomy of lower invertebrates, with field work upon the local fauna, both fresh water and marine.

7 hrs., first half-year; 3 units. Lectures, W, 1; laboratory, W, 2-5, and 3 hours to be arranged. Prerequisite: Course 3.

7A. **Advanced Zoology: Higher Invertebrates.** (G.E.)

Assistant Professor KOFOID.

A continuation of Course 7, but may be taken independently of it.

7 hrs., second half-year; 3 units. Lectures, W, 1; laboratory, W, 2–5, and 3 hours to be arranged. Prerequisite: Course 3.

8. **Seaside Laboratory.**

During the summer vacations, work in zoölogy is transferred to the seashore, and, as far as possible, the work done there is made an integral part of the work of this department of the University. During the summer of 1902 the laboratory will be at San Pedro and will be devoted exclusively to research and advanced individual instruction.

10. **Research Work.** (G.E.)

Associate Professor RITTER, Assistant Professor KOFOID, and Dr. BANCROFT.

Original study on special topics, in the field and laboratory.

11. **Advanced Cytology.** (G.E.) Assistant Professor KOFOID.

The structure and activities of the cell, with special reference to the phenomena of heredity and development. Given in alternate years at the option of the instructor. (Omitted in 1903.)

4 hrs., second half-year; 3 units. Lectures and laboratory and thesis. Prerequisite: Zoölogy 5.

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12. **Zoological Seminary.** (G.E.) Mr. TORREY.

Designed for the discussion of special topics, and to familiarize students with the most important contemporaneous advances in this field of science. A reading knowledge of German or French is essential.

1 hr., throughout the year. Hours to be arranged with the students. The fitness of students for this course will be determined in each case.

17. **Advanced General Vertebrate Zoology.**

Associate Professor RITTER.

An extension of the work done in Courses 1A and 1B. The course is particularly designed, both in its methods and in its subject matter, for those seeking the Teacher's Recommendation in Zoölogy. The work is almost entirely confined to the local fauna. Recitations, field, and laboratory work, and papers on assigned topics.

3 units, second half-year. S, 8–12. Prerequisite: Course 3.

18. **Problems of Regeneration.** Mr. TORREY.

The phenomena of regeneration and their relation to the problems of development and growth. Lectures and demonstrations.

2 hrs., second half-year. M, 10. Prerequisite: Course 3.

Entomology. See under Agriculture.

Palæontology. Courses 5A and 6A (see Geology) may be taken as group elective in Zoölogy by special arrangement with the department.

19. **The Nervous System.** Dr. BANCROFT.

Lectures and demonstrations on the comparative anatomy and physiology of the nervous system with its terminal organs. The laboratory exercises wlll deal mainly with the study of prepared specimens of the nervous system of the higher vertebrates. As this is not a Group Elective course, it may be taken as a required science by classical and literary students.

5 hrs., second half-year. 3 units. Tu Th, 9; W, 1–4. Prerequisite: Course 1.

PHYSIOLOGY.

20. **General and Vertebrate Physiology.** (G.E.) Dr. BANCROFT.

Lectures on the activities common to all living substance, together with recitations on the more important problems of vertebrate

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physiology. Demonstrations will accompany the lectures whenever possible.

3 hrs., first half-year. M W F, 9. When taken as Group Elective or as part of the course preparatory to medicine, this course must be accompanied by 21; as Free Elective it may be taken independently of 21. Prerequisite: Courses 1, 2, and 3, and matriculation Physics and Chemistry.

21. Physiological Laboratory. (G. E.) Dr. BANCROFT.

The work will be divided into three parts: (*a*) Chemistry of organisms; (*b*) Response of organisms to stimuli; (*c*) Muscle, nerve, and heart physiology.

6 hrs., first half-year; 2 units. Tu Th, 1–4. To be taken concurrently with Course 20. Prerequisite: The same as for Course 20.

22. Physiology of the Lower Animals. (G.E.) Dr. BANCROFT.

A study of the activities characteristic of all organisms, such as growth, differentiation, and regeneration. Lectures, recitations, and demonstrations.

3 hrs., second half-year. M W F, 8. To be taken with Course 23 if it is intended as a course preparatory to medicine or as Group Elective. Prerequisite: Same as for Course 20.

23. Physiological Laboratory. (G.E.) Dr. BANCROFT.

An introduction to research in physiology consisting of a rather detailed examination of some of the problems discussed in Course 22.

6 hrs., first half-year; 3 units. Tu Th, 1–4. To be taken with Course 22. Prerequisite: Same as for Course 20.

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GEOLOGY.

ANDREW C. LAWSON, Ph.D., Professor of Geology and Mineralogy.

JOHN C. MERRIAM, Ph.D., Assistant Professor of Palæontology and Historical Geology.

——— ———, Assistant in Geology.

There are no laboratory deposits in this department.

The Group Elective. Prerequisite to the Group Elective are Courses 1 and 2A in Physics, and Courses 1 to 4, inclusive, in Chemistry.

1A. General Geology: Dynamical and Structural.

Professor LAWSON.

Lectures.

3 hrs., first half-year. M W F, 10. Prerequisite: Elementary Chemistry and Physics. Prescribed, Junior year, in the Course in Sanitary Engineering, and Senior year, in the Course in Railroad Engineering, College of Civil Engineering; and Junior year, in the College of Mining.

1B. General Geology: Historical. (G.E.)

Assistant Professor MERRIAM.

Lectures.

2 hrs., second half-year. Tu Th, 10. Prerequisite: Course 1A or 5.

12. Physical Geology of North America. (G.E.) Professor LAWSON.

Lectures.

2 hrs., first half-year. Tu Th, 3. Prerequisite: Course 1A in Geology, and Course 1 in Mineralogy.

2. Field Geology. (G.E.) Professor LAWSON.

An inquiry by the student into the geological conditions which obtain in the region around the Bay of San Francisco, with occasional more extended excursions to points of especial interest; training in methods of field-observation and in interpretation of results.

1 unit, first half-year; 2 units, second half-year. Year Course. Fifteen field-days during the year. Prerequisite: Senior stand-

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ing; Course 1A in Geology; Course 1 in Mineralogy. Prescribed, Senior year, in the College of Mining. Students taking this course may be called upon to make excursions entailing an outlay for traveling expenses of $20.00.

2A. Economic Geology. (G.E.) Professor LAWSON.

Lectures.

3 hrs., second half-year. M W F, 10. Prerequisite: Geology 1A and Mineralogy 1. Prescribed, Senior year, in the College of Mining.

3. Petrography. (G.E.) Professor LAWSON.

Principles and methods of investigation of rock-forming substances, with special discussion of the most important ones. General petrology. Systematic petrography.

2 hrs., first half-year. Tu Th, 11. Prerequisite: Course 1A: Courses 2 and 2C in Mineralogy. Prescribed, Senior year, in the College of Mining.

4. Petrographical Laboratory. (G.E.)

Professor LAWSON and Mr. ———.

(*a*) Demonstrations of the different methods of investigation of the rock-forming minerals and rocks. (*b*) Practice in the determination of rocks by modern petrographical methods; preparation of thin sections, and use of the polarizing microscope.

3 hrs., first half-year; 1 unit; 6 hrs., second half-year; 2 units. First half, Section I, M, 1–4; II, W, 1–4. Second half, Section I, M, 1–4; W, 1–3; II, W, 3–5; F, 1–4. Prerequisite: Course 1A in Geology; Courses 2A, 2B, and 2C in Mineralogy. Prescribed, Senior year, in the College of Mining.

5. General Palæontology. Assistant Professor MERRIAM.

The general principles of the study of fossil organisms.

2 hrs., first half-year. Tu Th, 10. Preparatory to Geology 1B. Prerequisite: Zoölogy 1A.

5A. Palæontological Laboratory. (G. E.)

Assistant Professor MERRIAM.

Given in connection with Course 5. A study, principally from the biological standpoint, of the most important extinct forms.

4 hrs., first half-year; 2 units. M W, 1–4. Open to students taking Course 5.

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6A. **Practical Work on Palæontological Geology.** (G. E.)
Assistant Professor MERRIAM.

Given in connection with Course 1B. Laboratory work and excursions. For the purpose of studying the fossils and geological horizons of the Coast Ranges in the field, excursions to points of interest near Berkeley are made on convenient Saturdays during the term.

4 hrs., second half-year; 2 units. (1 unit laboratory, 1 unit excursion.) Open to students who have completed or are taking Course 1B.

11. **Vertebrate Palæontology.** (G. E.) Assistant Professor MERRIAM.

Comparative osteology, history, and affinities of the most important types of recent and fossil vertebrates.

3 hrs., first half-year. Lectures, M W, 9; laboratory work, W or F, 1–4. Prerequisite: Course 5 in Geology, or Course 1A in Zoölogy.

14. **Geological History of Man.** Assistant Professor MERRIAM.

1 hr., second half-year. Tu, 1. Prerequisite: Course 5 or 1B.

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8. **Advanced Palæontological Laboratory.** (G. E.)
Assistant Professor MERRIAM.

Studies in lines of descent. Practical work in the palæontology and organic geology of California.

Throughout the year. Credit value to be determined in each case. Prerequisite: Course 5A or 11.

10. **Inorganic Geology.** (G. E.) Professor LAWSON.

Discussions of special topics and advanced problems. Critical reviews of current literature. Prosecution of original geological research and publication of results. Methods of geological surveying and cartography. Petrographical studies.

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MINERALOGY.

ANDREW C. LAWSON, Ph.D., Professor of Geology and Mineralogy.

ARTHUR S. EAKLE, Ph.D., Instructor in Mineralogy.

A laboratory deposit of five dollars a year is required for Course 1, to cover cost of materials actually used and breakage of apparatus. Deposits are not required for other courses in this department.

The Group Elective. Prerequisite to the Group Elective are, in addition to Course 1 in Mineralogy, Courses 1 and 2A in Physics.

1. Mineralogical Laboratory. Dr. EAKLE.

The course comprises two parts: (*a*) Practice in the determination of unlabeled minerals by means of their physical properties, the apparatus consisting of pen-knife, pocket lens, streak plate, magnet, and acid bottle. The object is to give the student sufficient familiarity with the most commonly occurring minerals of geological and economic importance to enable him to recognize or determine them in the field without delay. (*b*) The latter half of the course is devoted to the determination of minerals by blowpipe analysis.

6 hrs., throughout the year; two units each half-year. Two sections: Tu Th, 9–12, 1–4. Prerequisite: Courses 1A and 3 in Chemistry. Elective, College of Civil Engineering, with Mechanical Engineering 8 or Drawing 8A. Prescribed, Sophomore year, in the College of Mining, to the extent of 1 unit each half-year.

2A. Crystallography. (G. E.) Dr. EAKLE.

The morphology of minerals.

2 hrs., first half-year. M W, 1. Prerequisite: Course 1. Prescribed, Junior year, in the College of Mining.

2B. Crystallographical Laboratory. (G. E.) Dr. EAKLE.

2 hrs., first half-year; 1 unit. M W, 2–4. Concurrent with Course 2A, and open only to students who are taking that course.

2C. Physical Properties of Minerals. (G. E.) Professor LAWSON.

Lectures.

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1 hr., second half-year. Th., 11. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Mining.

3. Descriptive Mineralogy. (G. E.) Dr. EAKLE.

A discussion of the salient properties and mode of occurrence of the more important minerals, with a classification of the same in natural groups; illustrated by typical specimens.

2 hrs., second half-year. M W, 10. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Mining.

5. Graduate Course. Dr. EAKLE.

Studies in the goniometrical investigation of crystals and in the determination of their physical constants. The acquiring of a wider and more thorough knowledge of minerals than is possible in the undergraduate courses.

Petrography. See Courses 3 and 4 under Geology.

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MECHANICAL AND ELECTRICAL ENGINEERING.

FREDERICK G. HESSE, Professor of Hydraulics.

CLARENCE L. CORY, M.M.E., Professor of Electrical Engineering.

JOSEPH N. LECONTE, M.M.E., Instructor in Mechanical Engineering.

WILLIAM A. LYNN, B.S., Instructor in Electrical Engineering.

CHARLES C. MAJOR, M.E., Instructor in Mechanical Engineering.

GROVER C. NOBLE, B.S., Assistant in Electrical Engineering.

GEORGE E. COX, Assistant in Mechanics and Foreman in Woodwork.

ALLEN C. WRIGHT, Assistant in Mechanics and Foreman in Machine Work.

OSCAR SCHOBER, Assistant in Mechanics and Mechanician.

Laboratory deposits in this department are at the rate of five dollars a half-year for each laboratory or mechanical practice exercise a week. The average amount returned to the student at the end of the half-year is about two-fifths of the deposit.

2A. Hydrodynamics. Professor HESSE.

Investigation of the action of forces producing equilibrium or motion in liquids; pressure, stability, flow, etc., as affected by gravity, inertia, outer and inner friction. General theory and construction of hydraulic motors and pumping machinery.

3 hrs., first half-year. M W F, 9. Prerequisite: Physics 5. Prescribed, Senior year, in the Engineering Colleges.

2B Hydrodynamics: Problems. Mr. LECONTE.

2 hrs., first half-year. Tu Th, 11. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

3A. Hydraulics and Hydraulic Machinery. Professor HESSE.

Discussion of such machines and apparatus as operate through the agency of fluids, either in modifying motion or transmitting power.

3 hrs., second half-year. M W F, 9. Prescribed, Senior year, in the College of Mechanics.

3B. Hydraulics and Hydraulic Machinery: Problems. Mr. LECONTE.

2 hrs., second half-year. Tu Th, 11. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

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4A. **Kinematics.** Mr. LeConte.

Theoretical: Treatment of motion without reference to the cause which produces it, comprehending the study of pure mechanism, or the mutual dependence of the movements in the parts of a machine. *Applied:* Application of the preceding to the various kinematic problems connected with machine-design and construction, such as link-motion, transmission by rolling and sliding contract, teeth of wheels, cams, form and proportions of the steam-engine and other motors.

2 hrs., throughout the year. W F, 8. Prescribed, Senior year, in the College of Mechanics.

4B. **Kinematics.** Mr. LeConte.

Draughting and designing.

3 hrs., second half-year; 1 unit. F, 1-4. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

5A. **Thermodynamics and the Theory of the Steam Engine.** Mr. Major.

Mechanical theory of heat, thermodynamics of gases and vapors, and the theory of the steam engine; discussion of the effects of compounding, jacketing and superheating; efficiencies of the steam engine.

3 hrs., first half-year. M W F, 10. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

5B. **Construction and Operation of Heat Engines.** Mr. Major.

Power plant equipment; construction and operation of steam, gas, oil and air engines, boilers, refrigerating machines, air compressors, steam turbines, etc.

3 hrs., second half-year. M W F, 10. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

7A. **Mechanical Laboratory: Experimental Engineering.** Mr. LeConte.

Experiments in hydraulics.

3 hrs., throughout the year; 1 unit each half-year. Tu, 1-4. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

7B. **Mechanical Laboratory: Experimental Engineering.** Mr. Major.

Experiments in steam engineering, tests of materials, etc.

3 hrs., throughout the year; 1 unit each half-year. Th, 1-4. Prescribed, Senior year, in the course in Mechanical Engineering, College of Mechanics.

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8A. Mechanical Practice. Mr. Cox.

Shop work in wood, including pattern-making.

6 hrs., first half-year: 2 units. Section I, M F, 1-4; II, Tu Th, 9-12; III, Tu Th, 1-4; IV, W, 1-4 and S, 8-11. Prescribed, Sophomore year, in the College of Mechanics.

8B. Mechanical Practice. Mr. Cox.

Continuation of Course 8A.

6 hrs., second half-year; 2 units. Elective, Sophomore year, in the College of Mechanics.

9A. Mechanical Practice. Mr. Wright.

Shop work in iron, including machine work.

6 hrs., first half-year; 2 units. Section I, M F, 1-4; II, Tu Th, 9-12; III, Tu Th, 1-4; IV, W, 1-4 and S, 8-11. Prerequisite: Course 8A or 8B. Prescribed, Junior Year, in the College of Mechanics.

9B. Mechanical Practice. Mr. Wright.

Continuation of Course 9A.

6 hrs., second half-year; 2 units. Section I, Tu Th, 1-4; II, M F, 1-4. Elective, Junior year, in the College of Mechanics.

10A. Electrical Machinery and Construction. Mr. Lynn.

Discussion of the construction and operation of electrical machinery, and its application to electric lighting and power distribution. The location and construction of electric lighting and power systems for cities, street railways and mines.

2 hrs., throughout the year. Tu Th, 11. Prerequisite: Mathematics 3B and Physics 2A and 3. Prescribed, Junior year, in the College of Mechanics.

10B. Electrical Machinery and Construction.
Mr. Lynn and Mr. Noble.

Laboratory tests.

3 hrs., second half-year; 1 unit. This course cannot be taken except in conjunction with Course 10A. Prescribed, Junior year, in the College of Mechanics.

11A. Alternating Currents and Alternating-Current Machinery.
Professor Cory.

The theory of the generation of single-phase and poly-phase alternating currents, the use of the complex quantity, and the calculation of the regulation and behavior of alternating-current apparatus and transmission lines.

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4 hrs., first half-year. Tu Th, 9-11. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics. Prerequisite: Courses 10A and 10B and Physics 5 and 7.

11B. Alternating Currents and Alternating-Current Machinery. Professor CORY.

The theory of the single-phase and poly-phase induction motor, synchronous motor and rotary converter, and their effects and operation in transmission systems.

4 hrs., second half-year. Tu Th, 9–11. Prerequisite: Courses 10A and 10B and Physics 5 and 7. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

11C. Alternating Currents and Alternating-Current Machinery: Laboratory. Mr. LYNN and Mr. NOBLE.

Practice in the laboratory, illustrating the work of the class-room.

6 hrs., throughout the year; 2 units each half-year. Section I, M Tu, 1–4; II, Th F, 1–4. Prerequisite: Courses 10A and 10B, and Physics 5 and 7. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

12A. Electrical Engineering. Professor CORY.

Discussion of the design, equipment, and management of electrical stations, and the long-distance transmission of power by electricity.

1 hr., throughout the year. M, 8. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

*12B. Electrical Engineering: Seminary. Professor CORY.

Critical discussion of special electrical installations.

2 hrs., throughout the year. Primarily for Graduates.

*12C. Electrical Engineering: Laboratory. Professor CORY.

Special tests and laboratory work.

Hours and credit value to be arranged. Primarily for Graduates.

*Not to be given in 1902–03.

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CIVIL ENGINEERING.

FRANK SOULÉ, Graduate U. S. Military Academy, Professor of Civil Engineering.

HERMANN SCHUSSLER, Honorary Professor of Water-Supply Engineering.

HENRY I. RANDALL, B.S., Assistant Professor of Civil Engineering.

JOHN H. DYE, B.S., Instructor in Civil Engineering.

——— ———, Instructor in Civil Engineering.

——— ———, Instructor in Civil Engineering.

——— ———, Assistant in Civil Engineering.

Laboratory deposits are five dollars a half-year for each laboratory course. The average amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is about three dollars.

COURSES FOR UNDERGRADUATES.

1A. Surveying. Mr. DYE, Mr. ——— and Mr. ———.

Theory of surveying; modern surveying instruments; methods employed in topographic, land, city, mining, and hydrographic surveys, and in making maps and calculations from field-notes. Full illustration by practical problems. Lectures and recitations.

2 hrs., throughout the year. Sections I and II, M F, 8; III and IV, M F, 9; V, Tu Th, 8. Prerequisite: Mathematics 3A. Prescribed, Sophomore year, in the Engineering Colleges.

1B. Field Practice and Mapping. Mr. DYE and Mr. ———.

The adjustment of surveying instruments in the field; taking of notes for plane and topographical surveys and making of maps from them; to illustrate the theoretical work of the class-room. Completed maps of all surveys will be required.

3 hrs., throughout the year; 1 unit each half year. Section I, W, 1–4; II, M, 1–4; III S, 8–11. Open to students who have taken, or are taking, Course 1A. Prescribed, Sophomore year, in the Engineering Colleges.

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1c. **Topographical Drawing and Lettering.** Mr. ———.

Lettering and conventional signs for topography with brush and pen.

3 hrs., second half-year; 1 unit. F, 1–4. Prescribed, Sophomore year, in the College of Civil Engineering.

2a. **Railway, Highway, and Canal Surveying.**

Assistant Professor Randall.

Methods of making reconnaissance, preliminary, and location surveys for railways, highways, and canals; analytical and graphical calculations of earthwork, masonry, etc. Full illustration by practical problems. Lectures and recitations.

3 hrs., first half-year. M W F, 9. Prerequisite: Courses 1a and 1b. Prescribed, Junior year, in the College of Civil Engineering, to students who elect Railroad or Sanitary Engineering.

2b. **Railroad Field Practice and Mapping.**

Mr. Dye and Mr. ———.

The most simple parts of railroad surveying, such as running in curves, laying out sidings, etc., and mapping the same.

6 hrs., first half-year; 2 units. M F, 1-4. Prescribed, Junior year, in the College of Civil Engineering, to students who elect Railroad or Sanitary Engineering.

2c. **Engineering Office Practice.** Mr. ———.

The plotting of profiles and cross sections; calculation of areas and volumes in masonry and earthwork; determination of areas by planimeter; tracing of maps and plans; draughting of timber and masonry structures from field-notes.

3 hrs., second half-year; 1 unit. M, 1–4. Elective, Junior year, in Engineering Colleges.

3a. **Summer Class in Field Practice and Mapping.**

Mr. Dye, Mr. ——— and Mr. ———.

For four weeks immediately following Commencement, an extended survey of a suitable tract in the vicinity of Berkeley is made. A camp is established in the country, and work is carried on, as far as possible, just as in actual practice. Theoretical study is more fully illustrated by continuous field-work than it can be during the regular university term. A general survey, illustrating methods of topographic, city, and mine surveying is made. All field notes are completely worked up in the office, and embodied in maps, computations, etc.

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Prerequisite: Courses 1A and 1B. Prescribed, at the end of the Sophomore year, in the College of Mining, and at end of Junior year in College of Civil Engineering.

3B. Summer Class in Railroad Field Practice and Mapping.
Mr. DYE, Mr. ——— and Mr. ———.

Given concurrently with 3A. The survey of a railroad line, illustrating methods of making preliminary location, and construction surveys. All field notes are completely worked up in the office, and embodied in maps, computations, estimates, etc.

Prerequisite: Course 2A. Prescribed, at the end of the Junior year, in the College of Civil Engineering, to students who elect Railroad or Sanitary Engineering.

4. Railroad Economics. Assistant Professor RANDALL.

Discussion of the theory of economic location and construction of railroads, based upon a study of operating expenses, rise and fall, distance, alignment, grades, etc.

3 hrs., second half-year. M W F, 9. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

5. Higher Surveying. Mr. ———.

Discussion of the figure of the earth, the measurement of base lines, and the methods of observing and making reductions in triangulation, mapping of large areas, trigonometric and precise spirit leveling.

2 hrs., second half-year. Tu Th, 8. Prerequisite: Courses 1A and 1B; Mathematics 3B and 10; Astronomy 7 and either 4A or 4B. (Also open to students who take Astronomy 4A or 4B concurrently, and who have the other prerequisites.) Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

6. Highways and Pavements. Mr. DYE.

Principles underlying the construction and maintenance of county roads and city streets and pavements.

2 hrs., second half-year. Tu Th, 9. Prescribed, Senior year, in the College of Civil Engineering, to students who elect the Railroad or the Sanitary Engineering Course.

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7A. Framed Structures. Assistant Professor RANDALL.

e computation of stresses in roofs and simple bridge trusses, both by analytical and by graphical methods; discussion of the different methods of loading bridges, and the more important details of construction. Fully illustrated by practical problems.

3 hrs., second half-year. M W F, 10. Open to students who have taken, or who are taking, Course 8A. Prescribed, Junior year, in the College of Civil Engineering, to students who elect the courses in Railroad and Sanitary Engineering, and, Senior year, in the College of Civil Engineering, to students who elect the course in Irrigation Engineering.

7C. Structural Design. Assistant Professor RANDALL.

Making complete detailed designs of several structures, such as a plate girder, roof and bridge trusses, etc.

9 hrs., throughout the year; 3 units each half-year. M W F, 1–4. Prerequisite: Course 7A. Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad or Sanitary Engineering.

8A. Strength of Materials. Professor SOULÉ.

Discussion of the elastic and the ultimate resistances of the materials used in construction; of the best methods in designing parts of structures, such as suspension rods, pillars, girders, and shafts; and of parts of uniform strength. Both analytical and graphical methods are used in demonstration. Lectures and problems.

4 hrs., second half-year. M Tu Th F: Section I, 8; II, 9. Prerequisite: Thoroughly satisfactory standing in the first half-year of Analytic Mechanics. Prescribed, Junior year, in the Colleges of Mechanics, Mining, and Civil Engineering.

8B. Civil Engineering Laboratory. Professor SOULÉ and Mr. ———.

Supplementary to Course 8A. Machine tests of limes, cements, mortars, concretes, building-stones, etc.

3 hrs., second half-year; 1 unit. Section I, W, 1–4; II, F, 1–4. Prerequisite: Course 8D. Prescribed, Junior year, in the College of Civil Engineering, to students who elect either Railroad or Sanitary Engineering.

8C. Advanced Course in Strength of Materials.

Professor SOULÉ and Mr. ———.

Supplementary to Course 8A. Lectures and laborabatory machine tests of timber, metals, etc.

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6 hrs., first half-year; 3 units. Lecture, Tu, 11; laboratory, Tu Th, 1–4. Second half-year; 2 units. Tu Th, 1–4. Prerequisite: Course 8A. For Seniors and Graduates. Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad or Sanitary Engineering. Students in the course in Sanitary Engineering omit the one unit of lectures in the first half-year.

8D. **Materials of Construction.** Professor SOULÉ.

Properties and characteristics of the materials used in engineering construction. Preparation for use; methods of testing strength and quality; preservation. Lectures.

2 hrs., first half-year. Tu Th, 9. Prescribed, Junior year, in the College of Civil Engineering.

8E. **Problems in Strength of Materials.** Professor SOULÉ.

Practical application of the principles of Course 8A.

2 hrs., second half-year; 1 unit. M W, 4. Open to those taking Course 8A.

9. **Sewer Systems.** Mr. ———.

Sanitation of cities and towns, and ventilation of dwellings. Lectures and criticisms.

2 hrs., first half-year. Tu Th, 11. Prescribed, Junior year, in the College of Civil Engineering, in the course in Sanitary Engineering.

11A. **Water Supply Systems.** Mr. ———.

Collection, storage, and distribution of water for public or domestic use. Discussion of means and methods adopted in the best practice.

3 hrs., first half-year. M W F, 10. Open to students who have taken, or who are taking, the course in Hydrodynamics (Mechanical Engineering, Course 2A). Prescribed, Senior year, in the course in Sanitary Engineering, College of Civil Engineering. In addition to the lectures of the regular course, there will be lectures from time to time by Professor SCHUSSLER.

11C. **Retaining Walls and Conduits.** Professor SOULÉ.

2 hrs., second half-year. Open to students who have completed Course 8A. Offered for 1903–4, 1905–6, etc.

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12A. Dams of Timber, Stone, or Earth. Professor SOULÉ.

3 hrs., first half-year, M W F, 8. Prescribed, Senior year, to students who elect the courses in Sanitary and Irrigation Engineering, in the College of Civil Engineering.

12B. Stone Arches and Bridges. Professor SOULÉ.

Theory of the stone arch; the designing and construction of bridges of stone.

2 hrs., second half-year; 2 units. M F, 10. For Seniors and Graduates in the College of Civil Engineering. Open to students who have completed Course 8A, and who are taking or who have completed Course 13. Offered for 1902–3, 1904–5, 1906–7, etc.

13. Foundations of Structures. Professor SOULÉ.

Foundations on land, under water, or in the sea.

2 hrs., second half-year; 2 units. Tu Th, 11. Prescribed, Senior year, in the College of Civil Engineering.

Analytic Mechanics.

See Course 5, under Physics.

Hydrodynamics.

See Course 2A, under Mechanical Engineering.

Graphostatics.

See Course 5 under Drawing.

Astronomy.

See Course 4B under Astronomy.

Irrigation.

See Courses 1, 2, and 3 under Irrigation.

GRADUATE COURSES.

14. Framed Structures. Assistant Professor RANDALL.

Continuation of Course 7A, including such subjects as swing, suspension, cantilever, and metallic, arch bridges, and the continuous girder. More advanced work in designing the details of framed structures.

3 hrs., first half-year—3 units. M W F, 8. MC. Prerequisite: Course 7A.

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*15. Laboratory Experiments. Professor SOULÉ.

Experiments upon, and investigations concerning, the materials used in engineering construction. Practical tests of the "theories of flexure." Tests of full-sized columns, girders, etc.

2 hrs., first half-year—1 unit. Prerequisite: Courses 8A, 8B, 8C, and 8D.

16. Specifications and Contracts. Professor SOULÉ.

Laws and forms of specifications and contracts in engineering operations. Lectures.

2 hrs., first half-year—2 units. Prerequisite: Graduation from the College of Civil Engineering.

*17. Framed Structures. Assistant Professor RANDALL.

A continuation of Course 7C.

6 hrs., or more, throughout the year—2 units, or more, each half-year. Prerequisite: Courses 7C and 14.

* Not to be given in 1902–03.

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IRRIGATION.

ELWOOD MEAD, M.S., C.E., Professor of the Institutions and Practice of Irrigation.

JAMES M. WILSON, C.E., Assistant Professor of Irrigation.

The purpose of this department is to give instruction in the methods and practices of irrigators in applying water to crops; the practical details of the construction, maintenance and operation of canals and reservoirs; and to furnish an opportunity for the study of the legal, social, and economic problems arising out of the development of irrigation in the arid west.

Courses 1, 2, and 3 are designed to meet the needs of engineering and agricultural students who wish to make a specialty of irrigation work. They appear as part of the Course of Irrigation Engineering in the College of Civil Engineering. They are also elective in the other Engineering Colleges and in the College of Agriculture.

Students of the Agricultural Department desiring to take these studies would do well to include Civil Engineering 1A, 1B, and 1C in their elective work for the first two years.

1. Organization of the Irrigation Industry.

Professor MEAD and Assistant Professor WILSON.

A study of the present condition of irrigation development in the United States; irrigation legislation; methods of establishing rights to water; interstate problems; conditions necessary to development of agricultural resources of the arid west; comparisons of irrigation methods and laws of other lands with those of the United States; irrigation in humid sections of the United States.

3 hrs., second half-year. Tu W Th, 4. Prescribed, Senior year, in the Course in Irrigation Engineering, College of Civil Engineering, and in some courses in the College of Agriculture.

2. Irrigation Engineering. Assistant Professor WILSON.

A study of the principles and practice governing in the installment and operation of irrigation plants. The location, construction, and maintenance of canals and reservoirs, with detailed study

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of irrigation structures, such as head gates, flumes, measuring boxes, weirs. Methods and instruments used in measuring the flow of water.

3 hrs., first half-year. M W F, 4. Prescribed, Junior year, in the Course in Irrigation Engineering; elective in the College of Civil Engineering and in the College of Agriculture.

3. Irrigation Economics. Assistant Professor WILSON.

A study of business methods used in the operation of irrigation plants; individual and coöperative works; corporate enterprises; water right contracts; methods of applying water to crops; duty of water; drainage.

2 hrs., second half-year. M F, 4. Prescribed, Junior year, in the Course in Irrigation Engineering; elective in other Engineering courses and in the College of Agriculture.

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MINING AND METALLURGY.

SAMUEL B. CHRISTY, Ph.B., Professor of Mining and Metallurgy.

ERNEST B. HERSAM, B.S., Assistant Professor of Metallurgy.

WALTER S. MORLEY, B.S., Instructor in Assaying, and Mill Assistant.

ARTHUR C. NAHL, B.S., Assistant in Mining.

FRANK RICHARDS, Laboratory Helper.

The lecture courses described below are fully illustrated by lantern-slides. The laboratory courses are designed to illustrate and supplement the lecture courses.

Laboratory deposits are twenty-five dollars a half-year for laboratory courses 7A, 7B, 9, 10, and 13. The amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is usually five or ten dollars.

1. Lectures on Mining. Professor CHRISTY.

Ores: their nature, occurrence, and relation to mining laws. Location of claims. Methods of prospecting, excavating, tunneling, shaft-sinking, and timbering.

4 hrs., first half-year. Tu Th, 9–11. Prerequisite: Senior standing in the College of Mining. Prescribed, Senior year, to students in the College of Mining.

2. Lectures on Mining. Professor CHRISTY.

Winning, exploration, and exploitation. Methods of transportation and hoisting; of drainage, ventilation and lighting; of general organization and administration.

4 hrs., second half-year, Tu Th, 9–11. Prerequisite: Course 1. Prescribed, Senior year, to students in the College of Mining.

3. Mining Laboratory. Professor CHRISTY and Mr. MORLEY.

Lectures and laboratory practice in sharpening, hardening, and tempering hand and machine drills; the use of single and double hand drills, and of machine drills; the placing, charging, and firing of blasts.

6 hrs. laboratory, second half-year; 2 units. 1 hr. lecture, W 9, and W, 1–4; and S, 9–12. Prescribed, Junior year, to students in the College of Mining.

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4. **Summer Class in Practical Mining.** (Senior Conference.)

During the vacation at the end of the Junior year, all mining students will be required to spend at least four weeks in the systematic study of practical mining, taking notes and making sketches of processes observed. This is the minimum requirement. It is recommended that all free vacation time throughout the four years be devoted to actual work underground at the various branches of practical mining. Details in every case must be arranged in consultation with Professor CHRISTY. A full report on this work must be presented and read before the Juniors and Seniors at the mining conference during the Senior year. This conference will be held weekly. W, 9–11.

5. **Metallurgy: Structural Metals and Fuels.** Professor CHRISTY.

The classification of ores: methods and appliances for their reduction, and their bearing on the physical properties of the structural metals. Fuels, and their relative value as heat-producers.

2 hrs., first half-year. M F, 9. Prerequisite: Chemistry, 1, 2, 3, 4; Physics, 1, 2A, and 3. Prescribed, Junior year, in the College of Mining. Elective, Junior year, in the College of Mechanics.

6. **Metallurgy: Ore Crushing, Sampling, Fluxes.**
Assistant Professor HERSAM.

Methods of crushing ores; of sampling ores and their products; fluxes, refractory materials, and metallurgical products.

2 hrs., first half-year. M W, 8. Prerequisite: Mining 5, and Chemistry 1 to 6 and Physics 1 to 3. Prescribed, Senior year, in the College of Mining. Required of students who elect Course 10.

7A. **Assaying.** Mr. MORLEY.

Lectures and laboratory practiec. The proper use and care of the assay balance. Cupellation of gold and silver. Parting of gold and silver. Preparation of the sample. Scorification assays of gold and silver ores. Crucible method for these ores.

6 hrs., first half-year; 2 units. Section I, M Tu, 1–4; II, W Th, 1–4; III, F, 1–4 and S, 9–12. Conference for all sections, W, 9–11. Prerequisite: Chemistry, 1 to 6 inclusive; Mineralogy 1; Mining 5. Prescribed Junior year, in the College of Mining.

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7B. Assaying. Mr. MORLEY.

Lectures and laboratory practice. Fire assays of ores of lead, antimony, tin, nickel, cobalt, copper, iron.

6 hrs., second half-year; 2 units. Section I, M Tu, 1–4; II, Th F, 1–4. Conference for both sections, W 9–11. Prerequisite: Course 7A. Prescribed, Junior year, in the College of Mining.

8. Metallurgy of Gold, Silver and Quicksilver. Professor CHRISTY.

Lectures on the amalgamation of gold and silver; processes for leaching silver ores; chlorination and cyanide processes with gold ores; quicksilver reduction and condensation.

2 hrs., first half-year. M F, 10. Prerequisite: Courses 5. 6, 7. Prescribed, Senior year, in the College of Mining.

9. Metallurgical Laboratory: Mill Work.

Assistant Professor HERSAM.

Supplementary to Course 8. Prerequisite: Course 8.

Experiments on a working scale in crushing, sampling, concentrating, roasting, leaching, and amalgamating gold and silver ores.

6 hrs., first half-year; 2 units. Sec. I, M T, 1–4; II, Th F, 1–4. Required of students in the College of Mining.

10. Metallurgical Laboratory: Mill Work.

Professor CHRISTY and Assistant Professor HERSAM.

Supplementary to Course 8.

The investigation of special problems in the treatment of ores, particularly of the precious metals. An introduction to research work. Such Seniors only as take this course will be allowed to elect a thesis in metallurgy.

6 hrs., second half-year; 2 units. Section I, M Tu, 1–4; II, Th F, 1–4. Elective, Senior year, in the College of Mining, Prerequisite: Courses 5, 6, 7, 8, and 9.

11. Metallurgy of Lead and Copper. Assistant Professor HERSAM.

Methods of smelting lead and copper ores, with particular reference to their gold and silver content.

2 hrs., second half-year. M F, 9. Prerequisite: Courses 5, 6, 7, 8. Prescribed, Senior year, in the College of Mining.

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12. **Ore Dressing.** Professor CHRISTY.

Theory of ore separation; discussion of the leading methods in use for separating coarsely and finely disseminated minerals, with particular reference to the treatment of gold and silver ores, and also those of copper, lead, zinc, iron and tin.

2 hrs., second half-year; 2 units. M F, 9. Prerequisite: At least Senior standing in the College of Mining. Primarily for Graduates.

13. **Special Investigations in Treatment of Gold and Silver Ores.** Professor CHRISTY.

For graduate students. Prerequisite: Courses, 5, 6, 7A, 7B, 8, 9, 10, 11, 12.

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DRAWING.

HERMANN KOWER, C.E., Assistant Professor of Drawing.

BERNARD R. MAYBECK, Instructor in Architecture.

C. CHAPEL JUDSON, Instructor in Free-hand Drawing.

WILLSON J. WYTHE, B.S., Instructor in Drawing.

CHARLES C. MAJOR, M.E., Instructor in Mechanical Engineering.

1. Instrumental Drawing. Mr. WYTHE.

Instrumental drawing, geometrical problems, mathematical curves, lettering.

6 hrs., first half-year; 2 units. Section I, Tu Th, 1–4; II, M F, 1–4; III, W, 1–4 and S, 9–12; IV, Tu Th, 9–12. Prescribed, Freshman year, in the Engineering Colleges.

1A. Elementary Free-Hand Drawing. Mr. JUDSON.

Drawing in pencil from models, embracing the study of light and shade (chiaroscuro) and perspective; with lectures.

3 hrs., throughout the year; 1 unit each half-year. Section I, W, 1–4; II, Tu, 1–4; III, Tu, 9–12; IV, F, 1–4. Prescribed, Freshman year, in the Engineering Colleges.

2A. Descriptive Geometry.

Assistant Professor KOWER and Mr. WYTHE.

Fundamental problems on point, line, plane; sections; intersections.

6 hrs., second half-year; 2 units. Section I, Tu Th, 1–4; II, M F, 1–4; III, W, 1–4 and S, 9–12; IV, Tu Th, 9–12. Prescribed, Freshman year, in the Engineering Colleges. Prerequisite: Course 1.

2B. Descriptive Geometry. Assistant Professor KOWER.

Perspective, isometric projection, shades and shadows.

6 hrs., first half-year; 2 units. Section I, Tu Th, 9–12; II, Tu Th, 1–4. Prescribed, Sophomore year, in the Colleges of Mechanics and Civil Engineering. Prerequisite: Course 2A.

3. Mechanical Drawing.

Assistant Professor KOWER and ——— ————

Drawing of simple machine parts.

6 hrs., second half-year; 2 units. Tu Th, 1–4. Prescribed, Sophomore year, in the College of Mechanics.

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4. **Mechanical Drawing.** Mr. LeConte.
Continuation of Course 3.

6 hrs., second half-year; 2 units. M F, 1–4. Prescribed, Junior year, in the College of Mechanics.

5. **Graphostatics.** Assistant Professor Kower.
Graphical analysis of stresses in engineering structures.

2 hrs., first half-year. Section I, M, 2–4; II, W, 2–4; III, F, 2-4. Prescribed, Junior year, in the Colleges of Mechanics, Mining, and Civil Engineering.

6. **Sewer Construction.** Assistant Professor Kower.
Designing of mechanical apparatus used in sewer systems, and for the drainage of lands; such as flush tanks, manholes, large sewers, connections, etc.

6 hrs., second half-year; 2 units. Tu Th, 1–4. Prescribed, Junior year, in the Course in Sanitary Engineering, College of Civil Engineering, in connection with the course in Sewer Systems, Civil Engineering 9.

7. **Construction.** Assistant Professor Kower.
This course is a continuation of Course 5, and includes the designing of engineering structures, such as roof-trusses, bridges, etc.

6 hrs., throughout the year; 2 units each half-year. M F, 1–4. Prescribed, Senior year, in the College of Mechanics, except to those who take the course in Electrical Engineering.

8A. **Elements of Structural Drawing.** Mr. Maybeck.
Graphical representation of bonds used in masonry; arch stones, gateways, pillars, domes, groined arches, cloistered arches, joints used in combining wood and iron, steel, etc.

3 hrs., throughout the year; 1 unit each half-year. M, 1–4. Elective, Sophomore year, in the College of Civil Engineering, alternative with Mechanical Practice 8A and 8B, and Mineralogy 1.

9 **Free-Hand Lettering and Round Writing.** Mr. Wythe.
3 hrs., second half-year; 1 unit. Open to students in Drawing.

10. **Shades and Shadows.** Assistant Professor Kower.
Continuation of Course 2B, intended for students of architecture.

6 hrs., second half-year; 2 units.

14. **Advanced Work in Free-Hand Drawing.** Mr. Judson
6 hrs., first half-year. W F, 9–12.

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ARCHITECTURE.

BERNARD R. MAYBECK, Instructor in Architecture.

1. Architectural Composition and Elements of Architecture.

Mr. MAYBECK.

Hours and credit value arranged with the students. Prerequisite: For students wishing to become architects, Freshman standing; for others, at least Junior standing.

2. Perspective Drawing: Lectures. Mr. MAYBECK.

Hours and credit value arranged with the students. Prerequisite: At least Junior standing; Drawing 2A and 2B, or their equivalent.

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AGRICULTURE, HORTICULTURE, AND ENTOMOLOGY.

EUGENE W. HILGARD, Ph.D., LL.D., Professor of Agriculture and Agricultural Chemistry; Director of Agricultural Experiment Station.

EDWARD J. WICKSON, M.A., Professor of Agricultural Practice, and Superintendent of University Extension in Agriculture.

ROBERT H. LOUGHRIDGE, Ph.D., Assistant Professor of Agricultural Geology and Agricultural Chemistry.

CHARLES W. WOODWORTH, M.S., Assistant Professor of Entomology.

*MYER E. JAFFA, M.S., Assistant Professor of Agriculture; in charge of Laboratory of Agricultural Chemistry.

GEORGE W. SHAW, M.A., Ph.D., Assistant Professor of Agricultural Chemistry; in charge of Beet Sugar Industry.

GEORGE E. COLBY, M.S., Instructor in Laboratory of Agricultural Chemistry.

LEROY ANDERSON, M.S.A., Instructor in Dairy Husbandry.

ARCHIBALD R. WARD, B.S.A., D.V.M., Instructor in Veterinary Science and Bacteriology.

EDMUND H. TWIGHT, B.S., Graduate of Ecole Nationale d'Agriculture de Montpellier, Assistant in Viticulture.

EDWARD H. HAGEMAN, Assistant in Cheese Making (October, November, December).

JOHN H. SEVERIN, Assistant in Butter Making (October, November, December).

Courses 1A, 1B, 4A, and 4B, are prescribed in the College of Agriculture. All the others are elective. Attention is called to the fact that the prescribed technical work (Courses 1 to 4 in Chemistry, 1 and 2 in Botany, and 1A, 1B, 4A, 4B in Agriculture) includes only that which is required of all students in the College of Agriculture; in addition to these there must be elected some special lines of study in Agricultural Chemistry, Practical Agriculture, Horticulture, Irrigation, Viticulture, Botany, Entomology, etc. These studies should be taken in groups corresponding to different professional lines, *viz.:* Practical Agriculture and Horticulture: Agricultural Engineering and Irrigation; Agricultural Chemistry, Physics, and Geology; Agricultural

*Absent on leave, 1902–03.

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Biology (Zoölogy, Entomology, and Botany); Agricultural Technology, (sugars, starch, bread, wine, fats, canning, etc.). For each of these lines, courses will be laid out by the corresponding instructors.

All courses in this department are given in the Agricultural Building.

Laboratory deposits are fifteen dollars a half-year for each chemical laboratory course.

AGRICULTURAL CHEMISTRY AND SOIL PHYSICS.

1A. General Course.

Professor HILGARD and Assistant Professor LOUGHRIDGE.

Chemistry of plants and their products. Inorganic ingredients of plants; ash analysis. Physics of plants; mechanism of nutrition. Fertilization; manures.

3 hrs., first half-year. Tu Th S, 11. Prescribed, Junior year, in the College of Agriculture.

1B. Chemistry and Physics of Soils.

Professor HILGARD and Assistant Professor LOUGHRIDGE.

Origin, formation, and classification of soils. Physical properties and mechanical analysis; chemical composition. Soil analysis—its methods, utility and interpretation. Policy of culture, exhaustion of soils and their restoration; drainage, irrigation; soils of the arid and humid regions; soil regions of the Pacific coast.

3 hrs., second half-year. Tu Th S, 11. Prerequisite: Botany 1 and 2; Chemistry 1, 2, 3, and 4. Prescribed, Junior year, in the College of Agriculture.

1D. The Physics of Soils.

Assistant Professor LOUGHRIDGE.

Relations of soils to temperature, water, air, etc.

1 hr. lecture, with or without 3 hrs. laboratory work; 1 or 2 units, first half-year. W, 11.

1E. Laboratory of Agricultural Chemistry.

Assistant Professor SHAW and Mr. COLBY.

Desk room is provided for about twenty advanced and special students, for instruction in the analysis of soils, waters, fertilizers, and agricultural products.

12 or 15 hrs., throughout the year, or half-year (as the student may elect); 4 or 5 units, each half-year. M Tu W Th F, 1–4; and S, 9–12. Prerequisite: Chemistry 4, 5A, and 5B.

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ADVANCED COURSES.

*1c. Relation of Climate to the Soil and to Agricultural Practice.
Professor HILGARD.

1 hr. lecture, with or without 3 hrs. laboratory work; one or two units, second half-year. F, 2. To be offered in alternate years.

17. Soil Areas and Soil Distribution in California.
Assistant Professor LOUGHRIDGE.

Lectures.

1 hr., second half-year. W, 11, Prerequisite: Courses 1A and 1B.

FOR GRADUATES.

22. Laboratory Research in Agricultural Chemistry.
Assistant Professor SHAW and Mr. COLBY.

AGRICULTURE, HORTICULTURE AND VITICULTURE.

4A. Agriculture. Professor WICKSON.

Field cultures of grains, vegetables, and forage plants.

3 hrs., first half-year. M W F, 9. Prescribed, Senior year, in the College of Agriculture.

4B. Horticulture. Professor WICKSON.

Principles and practice of fruit growing in semi-tropical countries, with special reference to Californian conditions and methods.

3 hrs., second half-year. M W F, 9. Prescribed, Senior year, in the College of Agriculture.

4D. Chemistry of Fruits. Mr. COLBY.

Chemical composition of fruits, and its relations to orchard soils, fertilizers, irrigation water, etc.

1 hr. lecture, second half-year; W, 4.

5D. Viticulture. Mr. TWIGHT.

A general course in the methods of establishing and maintaining a vineyard, with special reference to conditions existing in California. Lectures.

2 hrs., second half-year. M W, 10.

FOR GRADUATES.

21. Advanced Instruction in Horticulture. Professor WICKSON.

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AGRICULTURAL TECHNOLOGY.

2. Enology. Mr. TWIGHT.

A special course in vinification and the manufacture of grape products, including unfermented grape juice, sparkling wines, etc.

2 hrs., first half year. M F, 8.

2A. Analysis of Must and Wine. Mr. COLBY.

1 hr. lecture, 6 hrs. laboratory work; 3 units, first half year. Lecture M, 1; Laboratory, Tu Th, 9–12.

2B. Adulterations of Fermented and Distilled Liquors. Mr. COLBY.

1 hr. lecture, 6 hrs. laboratory work; 3 units, second half-year. Lecture, M, 1; Laboratory, Tu Th, 9-12.

It is essential that students entering Courses 2, 2A, and 2B should have some knowledge of elementary chemistry; and previous experience in wine-making will be of material advantage.

2C. Distilling Materials—Their Fermentation and Distillation. (Alcohols, Drugs, Perfumes.) Mr. TWIGHT.

2 hr. lectures, second half-year. Tu F, 10.

2D. Zymology. Mr. TWIGHT.

Lectures (once a week) on the micro-organisms of fermentation, especially the moulds, yeasts, and bacteria occurring on grapes and in fermented liquors; with laboratory work in the purification of yeasts, the testing of varieties of yeasts, and the microscopic examination of fermented liquors.

7 hrs., first half-year; 3 units. M W F, 1-4.

2E. Sugar House Control. Assistant Professor SHAW.

A chemical study of sugar house products designed to give practice in the analysis of beets; raw, finished and waste products of the sugar house: and the methods of calculating losses in manufacture.

1 hr. lecture and 6 hrs. laboratory; 3 units first half-year; lecture Tu, 1; laboratory, W Th, 1–4. Prerequisite: Chemistry 1, 4, 5B, 8.

FOR GRADUATES.

6. Beet Sugar Technology. Assistant Professor SHAW.

A study of practical methods of field and factory management in the production of beet sugar.

2 hrs., second half-year. Tu F, 1.

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PLANT DISEASES.

9A. Plant Diseases. Assistant Professor WOODWORTH and Mr. TWIGHT.

The effect on plants of unfavorable conditions and of the injurious attacks of insects, fungi, and other organisms, is studied from the standpoint of the farmer and fruit grower. The etiology of the diseases, the theories and methods of treatment, the action of remedies, and the modes of their application. Lectures.

2 hrs., first half-year. Tu Th, 9.

9B. Insecticides and Fungicides. Mr. COLBY.

The composition and compounding of remedies.

1 hr., first half-year. W, 4.

ENTOMOLOGY.

PRIMARILY FOR UNDERGRADUATES.

7A. Elementary Lectures. Assistant Professor WOODWORTH.

First half-year: (*a*) General Entomology, 1 hr.; (*b*) Economic Entomology, 1 hr.; Second half-year: (*c*) Ecology, 2 hrs.

1 or more hrs., either half-year. Tu Th, 11. See also 9A (Plant Diseases) and 9B (Insecticides and Fungicides).

7B. Elementary Laboratory. Assistant Professor WOODWORTH.

First half-year: (*a*) Morphology; (*b*) Entomotaxy. Second half-year: (*c*) Scale Insects; (*d*) Insectary Work. Each topic 6 to 9 hrs.

2 or more units, either half-year. Hours to be arranged.

8. Apiculture. Assistant Professor WOODWORTH.

Lectures on the structure and habits of bees; hives, apiary equipment, and management.

1 hr., second half-year. Th, 9.

FOR GRADUATES AND ADVANCED UNDERGRADUATES.

11. Advanced Lectures. Assistant Professor WOODWORTH.

First half-year: (*a*) Ontogeny, 3 hrs.; second half-year: (*b*) Phylogeny, 3 hrs.

3 or more hrs., either half-year. M W F, 4.

12. Advanced Laboratory. Assistant Professor WOODWORTH.

First half-year: (*a*) Variation, (*b*) Embryology, (*c*) Taxonomy; second half-year: (*d*) Morphogeny, (*e*) Field Ecology, (*f*) Taxonomy—each topic 9 to 12 hrs. Course 23 (*b*) must be taken concurrently with this course.

3 or more units, either half-year. Hours to be arranged.

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23. **Entomological Seminaries.** Assistant Professor WOODWORTH.

Continue throughout the year, but may be taken in either half. (*a*) Entomological Literature; (*b*) Laboratory Conference (required of students in Courses 12 and 24); (*c*) Seminary on Specialization—each topic 1 hr. each half-year.

1 or more hrs. Hours to be arranged.

24. **Research Work.** Assistant Professor WOODWORTH.

Course 23 (*b*) must be taken concurrently with this course.

At least 9 hrs.; 3 or more units.

ANIMAL INDUSTRY AND NUTRITION.

18. **Animal Industry.** Mr. ANDERSON.

Principles of breeding; history, characteristics and adaptability of the various breeds of farm animals.

2 hrs., lectures. M W, 10. 3 hrs., practice by appointment. 3 units first half-year.

19. **Dairy Husbandry.** Mr. ANDERSON.

A study of milk and the manufacture of milk products.

1 hr. lecture, M, 10; 6 hrs. practice by appointment. 3 units, second half-year.

3. **Chemistry of Dairying.** Assistant Professor SHAW.

Lectures.

2 hrs., first half-year. M W, 1.

3A. **Feeds and Feeding.** Mr. ANDERSON.

Lectures on cattle foods; principles of rational feeding of farm animals.

2 hrs., second half-year. W F, 10.

*3B. **Principles of Nutrition.** Assistant Professor JAFFA.

Discussion of the functions of nutrients and the theories of digestion.

1 hr., first half-year. S, 9.

*3C. **Composition and Use of Human Foods; Food Adulteration.** Assistant Professor JAFFA.

Lectures.

1 hr., second half-year. (For laboratory work in this subject see Course 3D).

* Not to be given in 1902–03.

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3D. Laboratory Course. Assistant Professor SHAW.

Analysis of dairy products, human and cattle foods, and detection of adulterations.

6 hrs., second half-year. Tu Th, 1-4. Prerequisite: Chemistry 4 and 5B.

*3E. Special Research in Animal Nutrition.

Assistant Professor JAFFA.

Advanced course.

1 hr. lecture; 6 hrs. laboratory work; 3 units, second half-year.

BACTERIOLOGY AND VETERINARY SANITARY SCIENCE.

10A. Bacteriology. DR. WARD.

This course is designed to provide the student with an elementary knowledge of bacteria and of the laboratory methods of studying them.

3 units, second half-year. Lecture M, 10, and 6 hours of laboratory work at periods to be arranged.

10B. Advanced Bacteriology. Dr. WARD.

Advanced study preparatory to and including investigation of special problems in pathological and dairy bacteriology. Conferences, laboratory, and topical readings.

Prerequisite: Course 10A, or its equivalent. Credit and hours to be arranged. Second half-year.

10C. Veterinary Sanitary Science. Dr. WARD.

A general course dealing with the infectious diseases of domestic animals, their recognition and control.

2 units, second half-year. Lectures, T Th, 9.

AGRICULTURAL LITERATURE.

13. Seminary Course.

An elementary course designed for the study of current agricultural literature, especially the publications of the Agricultural Experiment Stations of the several States.

1 hr., throughout the year. Tu, 10. Professor WICKSON; other instructors in the Department of Agriculture participating. Open to students in the College of Agriculture. Regular students are advised to begin the course in the Freshman year.

* Not to be given in 1902–03.

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UNIVERSITY EXTENSION IN AGRICULTURE.

14. **Seminary Course.**

Study and discussion of policies, methods, and practices of university extension in agricultural lines, as pursued by State Universities and Colleges of Agriculture.

1 hr., throughout the year. Th, 10. Professor WICKSON; other instructors in the Department of Agriculture participating. Open to students in the College of Agriculture.

Farmers' Institutes are held at various points in the State, to the number of about one hundred each year. Announcements of dates and subjects are made a short time previous to each Institute. The Institutes are conducted by Professor WICKSON, Mr. COOK, Mr. FOWLER, and other members of the staff of the College of Agriculture.

BOTANY.

The following courses directly related to agriculture, and prescribed or elective in the College of Agriculture, are given in the Department of Botany, where the announcement will be found in detail:

Economic Botany. [See Botany 14.] Mr. DAVY.

Commercial and Agricultural Botany. [See Botany 15.] Mr. DAVY.

Agrostology. [See Botany 17.] Mr. DAVY.

***Weeds, and Seed-Testing.** [See Botany 16.] Mr. DAVY.

Advanced Agrostology. [See Botany 28.] Mr. DAVY.

IRRIGATION.

The following courses directly related to agriculture, and prescribed or elective in the College of Agriculture, are given in the Department of Irrigation, where the announcement will be found in detail:

Organization of the Irrigation Industry. [See Irrigation 1.]
Professor MEAD and Assistant Professor WILSON.

Irrigation Engineering. [See Irrigation 2.]
Assistant Professor WILSON.

Irrigation Economics. [See Irrigation 3.]
Assistant Professor WILSON.

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*Not to be given in 1902–03.

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SPECIAL DAIRY COURSE.

First half-year, beginning Tuesday, October 7th, and closing Thursday, December 18th. This course consists of practical work in making butter and cheese, testing milk for fat and adulterations, and operating dairy machinery, supplemented by lectures and recitations treating of the principles involved in modern dairy practice.

Four rooms on the ground floor of the Agricultural Building have been fitted up for the use of the Dairy School. The largest one, about 30 by 40 feet, is used as the work-room for making butter and cheese. One is for the dairy laboratory, one for cold storage and for cheese curing, and the fourth for a dressing-room. These are fitted with the best appliances for their special uses that can be secured, and they make comfortable and convenient working quarters for about thirty-six students.

The dairy course is open to all persons of good moral character who are at least seventeen years of age and who have a common school education. No formal entrance examinations will be required, but it is expected that all applicants will have had sufficient school training to enable them intelligently to understand lectures, take notes, and perform the necessary text-book work. The usual grammar school course gives a fair preparation for this work, although the better the previous education of the student the greater will be the benefit to be derived from the instruction given.

Grasses and Forage Plants. Professor WICKSON.

6 lectures.

Chemistry of Dairying. Assistant Professor SHAW.

6 lectures and demonstrations.

Feeds and Feeding. Mr. ANDERSON.

12 lectures on the principles of feeding farm animals.

Milk and its Products. Mr. ANDERSON.

24 lectures and demonstrations.

Breeds and Breeding. Mr. ANDERSON.

12 lectures, with practical work in scoring and judging cattle.

Dairy Bacteriology. Dr. WARD.

14 lectures and demonstrations.

Veterinary Science. Dr. WARD.

14 lectures and demonstrations.

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Steam Engine. Mr. MAJOR.

6 lectures, with practice in running engines.

Dairy Laboratory. Mr. ANDERSON and Dr. WARD.

Cheese-Making. Mr. HAGEMAN.

10–4, daily.

Butter-Making. Mr. SEVERIN.

10–4, daily.

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MILITARY SCIENCE AND TACTICS.

HENRY DE H. WAITE, Graduate U. S. Military Academy, Professor of Military Science and Tactics.

1. Practical Course. Professor WAITE.

Covering the following subjects: *(a)* Infantry exercises in the schools of the soldier, company, battalion, and regiment; extended-order movements, target practice, duties of a sentinel, ceremonies; patrols, advance guards, rear guards, and outposts; military topography. *(b)* Artillery exercise in the manual of the piece, and mechanical maneuvers; saber exercises. *(c)* Military signaling with flag, torch, and heliograph; telegraphy. *(d)* Band practice. When the weather is inclement, lectures are delivered to the regiment on the aims of the department, discipline, drill regulations, etc. Examinations are held at the close of each half-year, covering the subjects taught on the drill-ground.

2 hrs., throughout the year; ½ unit each half-year. M W, 11. Prescribed, during the first three years of their attendance, to all able-bodied male undergraduate students; and in the fourth year, to officers of the regiment.

2A. Theoretical Course. Professor WAITE.

Lectures and recitations on the organization and administration of the United States Army, supply and discipline of the company, military law, field-works.

1 hr., first half-year. Tu, 4. Prescribed, during the fourth year of their attendance, to all able-bodied male undergraduate students.

2B. Theoretical Course. Professor WAITE.

Continuation of Course 2A. Preparation for war, the staff, tactics of the three arms, reconnoissance, security, marches, grand tactics, minor operations, logistics, strategy, military history, and material of war.

1 hr., second half-year. Tu, 4. Prescribed, during the fourth year of their attendance, to all able-bodied male undergraduate students.

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PHYSICAL CULTURE.

WALTER E. MAGEE, Assistant Professor and Director of Physical Culture.

ARNOLD A. D'ANCONA, A.B., M.D., Professor of Hygiene.

GEORGE F. REINHARDT, B.S., M.D., Instructor in Physical Culture.

MARY B. RITTER, M.D., Medical Examiner of Women and Lecturer on Hygiene of Women.

GENEVRA E. MAGEE, Assistant in Physical Culture.

LOUISA A. PLACE, Assistant in Physical Culture.

The work for men in Physical Culture is conducted in the Harmon Gymnasium on the University grounds.

Each male student is examined from time to time, with reference to his health and physical development, and appropriate exercises are prescribed. These exercises are conducted in classes, so far as is practicable; but in many cases individual instruction is given. A supervision of student athletics is exercised by the Department. The expenses for each student are: Four to five dollars for a regulation suit, which consists of one pair of navy blue full tights, one white cotton or woolen shirt, one pair navy blue trunks, one supporter, and one pair rubber-soled shoes; and an annual rental of one dollar for a locker.

The Hearst Gymnasium is reserved for the exclusive use of young women. The young women are examined with reference to their health by the physician for women; and exercises adapted as nearly as possible to individual needs are prescribed. The expenses are: (1) from four to five dollars for a regulation suit; (2) an annual rental of one dollar for a locker.

Courses 1A, 1B, 2A, *and* 2B *are to be taken in addition to the 125 (or more) units required for a degree.*

1A. Course for Men.

Assistant Professor MAGEE and Dr. REINHARDT.

Exercises without apparatus; the developing appliances; chest-weights, dumb-bells, and Indian clubs. Exercises in walking and running; mat exercises; vaulting-horse, parallel bars, rings, and horizontal bars.

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4 hrs., throughout the year; 1 unit each half-year. Two sections. M Tu Th F, 3; 4. Prescribed to all men undergraduates during the first year of their attendance at the University.

1B. Hygiene. Professor D'ANCONA.

Lectures on the general care of the body; first aid to the injured; personal hygiene.

1 hr., throughout the year; 1 unit each half-year. One section. W, 4. Prescribed to all men undergraduates during the first year of their attendance at the University.

2A. Course for Women.

Assistant Professor MAGEE, Mrs. MAGEE, and Miss PLACE.

Exercises without apparatus; breathing exercises; the developing appliances; relaxing exercises, walking, running, and mat exercises; chest-weights, dumb-bells, wands, bar-bells, Indian clubs, stall bars, Swedish boms, rings. Recreative exercises.

4 hrs., throughout the year; 1 unit each half-year. Two sections. M Tu Th F, 3; 4. Prescribed to all women undergraduates during the first year of their attendance at the University.

2B. Hygiene. Dr. RITTER.

Lectures and recitations on personal hygiene, foods, and domestic sanitation.

1 hr., throughout the year; 1 unit each half-year. Two sections. W, 3; 4. Prescribed to all women undergraduates during the first year of their attendance at the University.

3. History of Physical Culture. Assistant Professor MAGEE.

The gymnastic training in ancient Greece; modern training in Sweden, Germany, and England; physical training in the United States, and its further development.

2 hrs., first half-year. M F, 9.

4. Anthropometry. Assistant Professor MAGEE.

History of Anthropometry; Greek standards, modern art proportions, description of modern instruments, charts; the technique of measurements; items and rules of the American Association for the Advancement of Physical Education

1 hr., second half-year. M, 9. Prerequisite: First half-year of Course 7.

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5. Physical Examinations. Assistant Professor MAGEE.

Methods of measuring, including photography; testing and examining individuals, to note variations from the normal and to ascertain their fitness for particular exercises.

1 hr., second half-year. F, 9. Prerequisite: First half-year of Course 7.

6. Exercises Adapted to Public Schools.

Assistant Professor MAGEE.

Lectures and recitations. Breathing exercises; the proper manner of sitting, standing, walking, running; free movements, figure marching, light gymnastics with dumb-bells, bar-bells, wands, Indian clubs; exercises without apparatus, chest-weights, mat exercises; elementary exercises on vaulting-horse, parallel bars, horizontal bar; care of apparatus; recreative games.

1 hr., throughout the year. W, 9. Prerequisite: For men, Courses 1A and 1B. For women, Courses 2A and 2B.

7. Human Anatomy and Demonstrations. Professor D'ANCONA.

1 hr., throughout the year. M, 10.

8. Advanced Hygiene. Dr. RITTER.

Lectures and recitations covering the general subjects of personal hygiene, foods, and domestic sanitation. Demonstrations illustrating the lecture will be made by means of microscopical preparations, diagrams, and models.

2 hrs., throughout the year. Tu Th, 3. Elective to all women students.

NOTE.—The Department will, in general, recommend as qualified to teach Physical Culture only such graduates as have passed with credit Courses 3, 4, 5, 6, 7, and 8.

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THE LIBRARY.

JOSEPH C. ROWELL, A.B., Librarian.

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FANNIE S. BONTÉ, Assistant in the Library.

J. ARTHUR ROWELL, Assistant in the Library.

EDITH VAN ALLEN, Cataloguer.

AMY L. PHELAN, Assistant in the Library.

The Use of the Library. Mr. ROWELL.

Introductory lectures, given to the entering class at the opening of each academic year. Description of the University Library; its contents, arrangement, and catalogues; use to be made of books of reference, bibliographies, and indexes; methods of reading and of research in books, especially as related to university studies.

In addition to this general introduction, personal assistance and suggestion upon all matters connected with the use of the Library will be given at all times, upon application to the Librarian or his assistants.

By previous appointment, Mr. Rowell will devote Thursday evenings to assisting students in bibliographical investigations.

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REGISTRATION.

To the Student. In making up your list of courses, consult this ANNOUNCEMENT OF COURSES and such supplementary announcements as may have been issued; consult, also, the SCHEDULE OF EXERCISES. Give the exact name and number of each course, following in each case the latest announcement. Freshmen should confer with their advisers regarding plans of study.

The edition of the ANNOUNCEMENT is necessarily limited. This copy should be preserved for use throughout the year.

(For the requirements for the several degrees, see the University REGISTER.)

REGULATIONS GOVERNING CHOICE OF STUDIES.

1. Regular Students in the *Colleges of Letters*, *Social Sciences*, *Natural Sciences*, and *Commerce* are not expected to take more than sixteen units a week during any half-year. In the first half of the Freshman year they may take not more than nineteen units a week, provided they have no entrance deficiencies; and after the first half of the Freshman year, they may take nineteen units a week during any half-year, provided they have no entrance deficiencies and no deficiencies in University work.

2. In the *Colleges of Agriculture*, *Mechanics*, *Mining*, *Civil Engineering*, and *Chemistry* there is a certain minimum of studies prescribed. Regular students of these colleges may take not more than nineteen units a week on complying with the conditions specified in ¶ 1, above.

3. A regular student may be required or allowed to take a smaller amount of work than the minimum stated above.

4. Special Students have free election, subject to the requirement that they confine their attention to some special study and its related branches. During their first half-year at the University they may take not more than nineteen units per week; and after the first half-year they may take nineteen units a week, provided they have incurred no deficiencies.

5. Limited Students have all their studies elective, but they are limited to thirteen units a week.

6. Any student having a deficiency—whether it be an entrance or a college deficiency—remaining unremoved for more than one year, will be restricted in his choice of studies to thirteen units a week until the deficiency shall have been removed.

7. All able-bodied male Undergraduates, including Special Students, are required to devote to military exercises two hours a week during the first three years, and one hour a week during the fourth year; and all Undergraduates, including Special Students, are required to devote to physical culture five exercises a week during their first year's residence at the University. The Practical Course in Military Science is credited at the rate of one-half unit per half-year, and the Theoretical Course at the rate of one unit per half-year.

8. No student will be permitted to enter upon the study of any subject if the officer of instruction in charge of that subject is satisfied that by reason of lack of preparation he is not competent to undertake it. This rule takes precedence of all others.

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